NORTHWEST
MISSOURI STATE UNIVERSITY
FACILITY SERVICES

Guidelines for Design & Construction

November 2025
Version 9

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Division 1 - General Requirements

01 10 00 Summary

01 11 00 SUMMARY OF WORK

General Information

Section 01 11 00 Summary of Work requirements shall be provided by A/E for all projects.

01 14 00 WORK RESTRICTIONS

Access to Site

General: All access to site shall be obtained by roads and approved sidewalks unless otherwise approved by Northwest Facility Services; contractor shall be liable for any damage resulting due to noncompliance. Sidewalks shall not be used by vehicular traffic unless authorized in writing by Northwest Facility Services in advance.

Parking: On-site parking for any project is limited to one marked (signed) company vehicle per contractor and sub-contractor; and such parking shall be only in approved areas. All other vehicles must be parked in lots designated by Northwest Facility Services.

Parking Accountability: General contractor and prime contractor shall be held accountable for parking and site access of all of their subs.

Parking Permit: All vehicles – including job site vehicles – must acquire a parking permit from Northwest University Police. The permit shall be for the duration of the contract and shall allow parking only during normal business hours (7 a.m. to 5 p.m.). Work necessary to be performed out of this timeframe must be approved by Northwest Facility Services.

- END OF SECTION -

01 40 00 - Quality Requirements

01 40 00 General Information

The numbering of floor plans is not at the discretion of the designer. All room numbering must be coordinated with Northwest Facility Services.

01 41 00 Regulatory Requirements

1. All appropriate systems (i.e.: roof systems, sprinkler systems, etc.) must be supplied to Northwest's current insurance carrier for review.

ADA Compliance

Unless otherwise specified Northwest will require compliance with ADA Accessibility Guidelines (ADAAG), current edition.

Building Codes

Northwest Missouri State University requests all projects to be designed in substantial conformance with the Building Codes adopted by the City of Maryville, Missouri, https:/www.maryville.org/The A/E is responsible for investigating and determining which codes are in force at the project site, and for designing and specifying accordingly. A/E may submit written requests to Northwest Facility Services, with full documentation, requesting deviations from the local codes, or the substitutions of more stringent codes.

1. At the time of publication of this document, adopted City codes include:
    a. 2017 National Electric Code
    b. 2018 International Building Code
    c. 2018 International Residential Code
    d. 2018 International Mechanical Code
    e. 2018 International Fuel Gas Code
    f. 2018 International Plumbing Code
    g. 2018 International Fire Code
    h. 2018 International Property Maintenance Code

2. Comply with 2021 International Energy Conservation Code for state funded projects.

3. The Architect/Engineer may reference other codes or standards throughout the Project Manual when deemed appropriate for proper compliance with regulatory requirements.

Hazardous Materials

A/E shall ensure the project design is in compliance with Missouri Department of Natural Resources regulations regarding treatment of all hazardous materials, air quality and water quality.

Confined Space Policy

All contractors doing or performing work for Northwest shall adhere to its set confined space policy. Failure to comply with this set policy will result in a breach of contract with Northwest. A/E shall obtain policy details from Northwest Risk Management and Northwest Project Manager.

Lockout/Tagout Policy

All contractors doing or performing work for Northwest shall adhere to its set lockout/tagout policy. Failure to comply with this set policy will result in a breach of contract with Northwest. A/E shall obtain policy details from Northwest Risk Management and Northwest Project Manager.

Key Policy

All contractors doing or performing work for Northwest shall adhere to its set key policy, which consists of the following:

1. Contractors needing keys to access a university project must complete and have authorized, a “Master Key Authorization Form”. Forms are available from the Northwest Project Manager or Facility Services. Keys must be checked out and checked back in on a daily basis from Northwest University Police. Information needed from the contractor for this form includes:
    a. Company Name
    b. Daytime Phone
    c. Nighttime Phone
    d. Company Representative

    Information that Northwest will provide includes:
    a. Access Required for Project
    b. Project Name
    c. Project Duration
    d. University Authorization
    e. Key Cabinet
    f. PIN Number
2. Checkout and return of keys shall be a daily procedure. Contractor will use PIN provided to acquire and return key(s) for listed project. (Training available at time of activation.)
3. Keys are available during normal business hours. If keys are not returned within the workday the cabinet will go into an alarm mode at which point University Police will contact the responsible contractor to get keys returned.
4. Contractors shall confirm access-related approvals/criteria with Northwest prior to being allowed in residential student/staff rooms.

5. There shall be one representative per contractor per key ring. That representative and his/her company assume all liability for key usage and management during check out periods.
6. Costs of replacing lost or stolen keys and rekeying shall be charged to the contractor. (Minimum cost to replace lost keys may vary between $500 per single access key, up to $100,000 per key for multi-access keys. Each electronic access credentials cost $100 per credential.)
7. The duration of contractor access to keys will be established prior to assignment. Any changes to personnel, timelines, or access needs must be provided in writing to Facility Services and University Police through the University project manager. Key access will be disabled as initially scheduled unless otherwise approved by Facility Services.

Testing Laboratory Services

Use one of the following options for testing laboratory services in developing section 01 45 29, as approved by Northwest.

1. Architect/Engineer will employ and pay for an independent testing laboratory to perform specified services. (This option is Northwest's standard)

   * * * OR * * *

2. Northwest will employ and pay for an independent testing laboratory to perform specified services. (*Only to be used with written authorization by Northwest. Verify with Northwest Project Manager.)

   * * * OR * * *

3. (*General) Contractor employ and pay for an independent testing laboratory to perform specified services. (*Primarily for Northwest In-House designed projects.)

The Testing Laboratory shall not be authorized to:

1. Release, revoke, alter or enlarge on, contract requirements.
2. Approve or accept any portion of work.
3. Perform any duties of the Contractor.

- END OF SECTION –

01 50 00 - Temporary Facilities and Controls

01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

Placement of Fencing

Fencing shall be placed as directed by Landscape Services to protect Northwest landscape. Fencing installed by the contractor or the owner for the protection of Northwest landscape shall not be moved or removed without permission by Landscape Services and/or Northwest Project Manager.

Fencing may be either 6-ft. chain-link with posts no further than 10-ft. apart; or plywood fence, 8-ft. high, framed with four (4) 2”x4” rails, and preservative-treated wood posts spaced not more than 8-ft. apart. Coordinate with Northwest Purchasing Division 1 specification requirements 01 58 00 Project Identification.

01 58 00 PROJECT IDENTIFICATION

Temporary Project Signage

Project identification signage content shall be designed by the A/E and installed by the Contractor, if required by Northwest. A/E shall confirm signage requirements with the Northwest Project Manager.

- END OF SECTION –

Division 2 - Site Construction

02 21 13 - Site Surveys

02 21 13 BOUNDARY AND SURVEY MARKERS

Boundary Markers

Geographic monuments are located throughout Northwest's campus and shall be used when developing civil drawings. Monument locations are available from Northwest Facility Services. Any additional monuments shall conform to standards listed herein.

Horizontal Control: The relative accuracy of the distance between directly connected adjacent points shall be equal to or less than one tenth of a foot (.10) or 1:20,000 for distances greater than 2000 ft.

Acceptance: For acceptance by Northwest, the following shall be required:

1. A sketch shall be submitted showing all stations occupied during the control survey. In addition to occupied stations, the sketch shall show other existing horizontal or vertical stations located within or near the project area.
2. A legend on the sketch shall show the following information: project name, general locality, name of organization performing observations, date of project start and completion.
3. A north arrow and graphic scale shall appear on the sketch. All station symbols shall be labeled with the station identification number with an inset used when stations are spaced too closely together to be clearly depicted on the network sketch.
4. A report shall be submitted for each project and shall be signed and sealed by the surveyor or engineer in responsible charge. The report shall be the main source of information for judging whether the stations should be accepted by Northwest. It shall be the responsibility of the surveyor or engineer to supply sufficient information in the report to facilitate inclusion of the stations into the Northwest Control Network.
5. The report shall contain a clear description of the survey procedures and equipment used in the field. This includes, but it's not limited to, the information entered into the field log and auxiliary information such as logistics, pre-analysis and satellite selection results (if Global Positioning Satellite [GPS]) survey, personnel involved, and difficulties encountered.
6. Traverse Surveys: For Traverse Surveys, all field data used to determine directions, distances, azimuths, and elevations, the adjustment calculations shall be submitted along with the name of the software used in the adjustment. The data submitted shall show the final results of the adjustment and the error analysis.

GPS Survey Guidelines:

1. At least three existing higher or equal order control points shall be included in any proposed Global Positioning Satellite (GPS) survey.
2. Each new point to be established by the proposed GPS survey shall be occupied at least two separate times to enable proper checking of blunders (e.g. incorrect point, setup errors, and incorrect antenna heights). A separate occupation is one where the antenna has been taken town and set up again and the receiver restarted.
3. Each point shall be connected by simultaneous occupations (i.e. base line) to at least three other points in the network.
4. The raw data files for all station occupants shall be submitted. Each shall consist of one set of raw observations for each station occupation session.
5. If the GPS survey project includes any surveys using conventional or terrestrial horizontal surveying techniques, copies of all field notes and associated data shall be submitted.
6. When the GPS survey project includes surveys performed using conventional differential leveling techniques, copies of all field notes and associated data shall be submitted.

Traverse Survey Guidelines: All traverse lines shall start from, and close upon, existing approved control stations of the Northwest Control Network in accordance with the procedures listed below.

1. Properly maintained theodolites with a least count of 1 second or a din rating of 1½ seconds or better shall be used to observe directions and azimuths. At least four positions or repetitions of the angles shall be observed.
2. Electronic distance measuring instruments shall be used to measure all distances. Electronic Distance Measuring (EDM) instruments shall be tested on a DNR base line before initiating the control traverse. Copies of the EDM calibrations shall be provided to the department in the survey report.
3. Each traverse shall be tied to a minimum of two benchmarks.
4. All traverse lines shall start from and close upon approved control station and shall be run in closed circuits.
5. See "Monument Specifications" within this section for details regarding construction and marking of control monuments

Monument Specifications

Specifications for Construction and Marking
of
Horizontal and Vertical Control Monuments

VI-1 Description

This work shall consist of the construction, materials, and marking of permanent survey markers at locations shown on a plan, survey project diagram, or as directed by the appropriate Northwest Missouri State University personnel.

VI-2 Materials

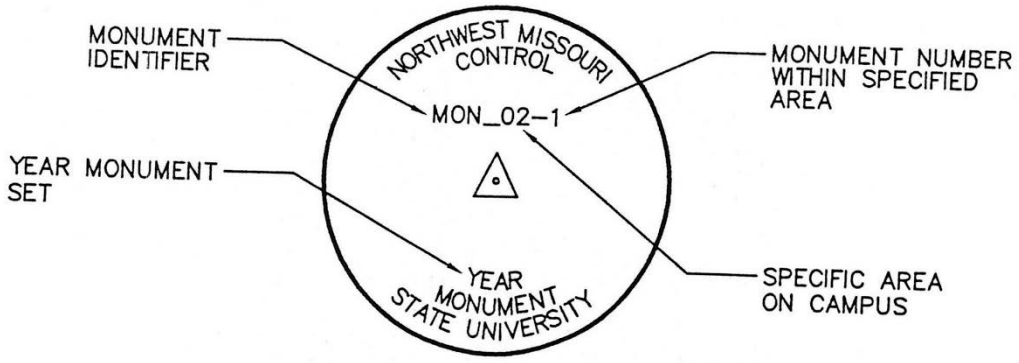
The materials to be used shall be those on the monument drawings “E” and “F”.

VI-3 Construction

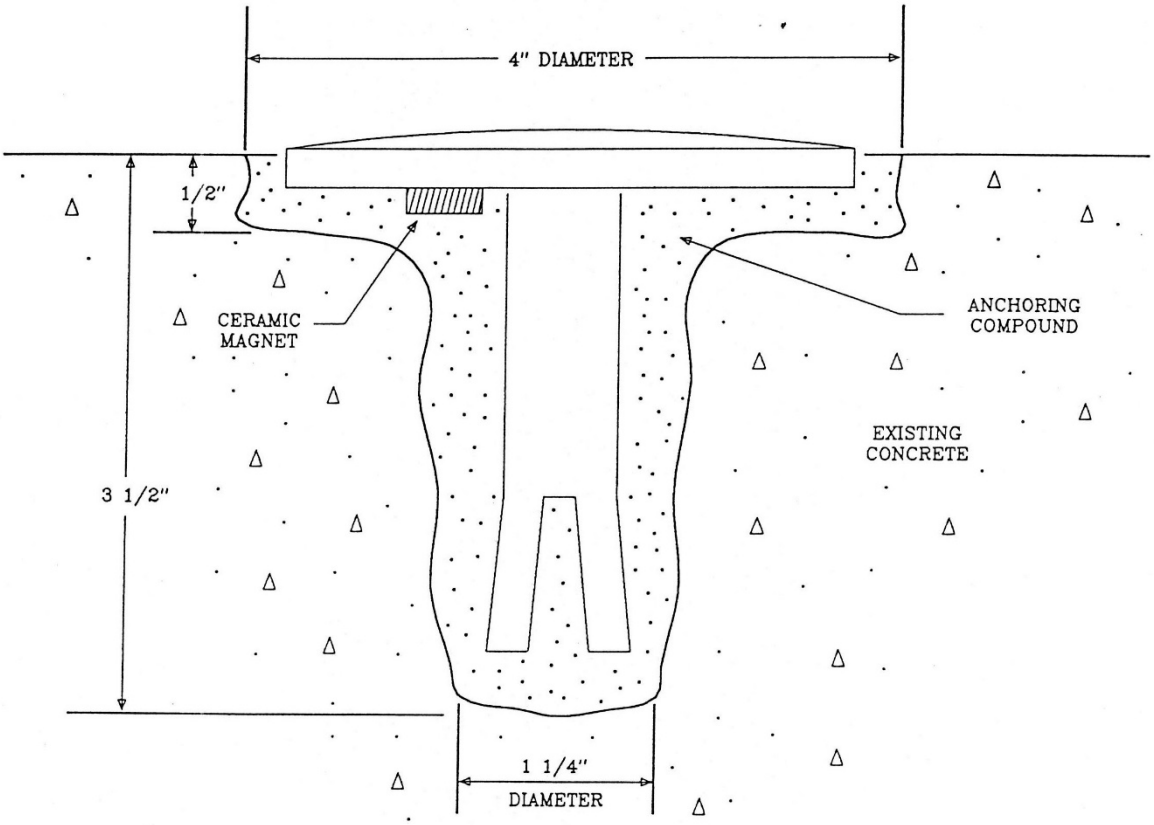
The size and shape of the marker shall conform to Drawings “E” and “F” attached to this specification. Excavation for marker shall be made by hand or machine drill. The concrete shall be poured and consolidated in a single pour. The surface of the concrete should be flush with the ground. The disk shall be set flush with the concrete surface and centered in the concrete. The surface of the monument shall be finished in a professional looking manner.

VI-4 Marking

The disk shall be stamped to identify the permanent marker. The naming system shall be as follows:

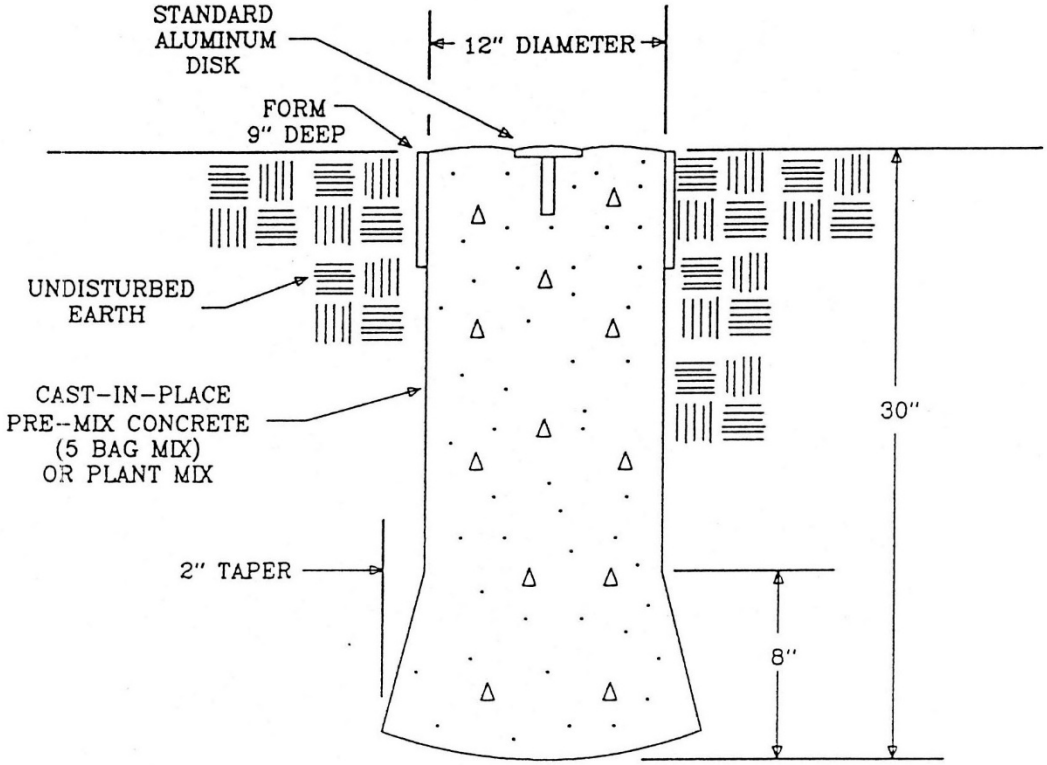


TYPE"E"

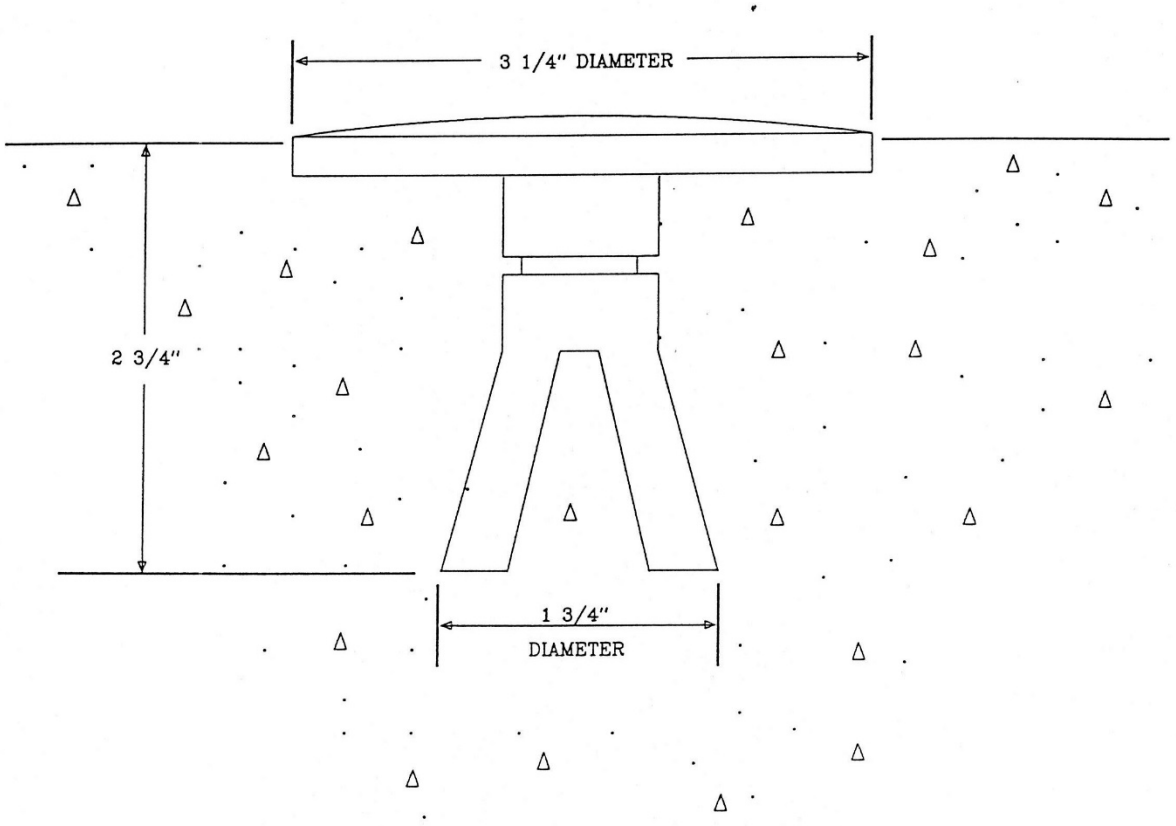


MONUMENT SET IN EXISTING CONCRETE OR SOLID ROCK

TYPE "F"


STANDARD
ALUMINUM
DISK
12" DIAMETER
FORM
9" DEEP
UNDISTURBED
EARTH
CAST-IN-PLACE
PRE-MIX CONCRETE
(5 BAG MIX)
OR PLANT MIX
2" TAPER
30"
8"

DETAIL OF TYPE "F"



MONUMENT CAST IN PLACE

- END OF SECTION -

02 41 00 - Demolition

02 41 00 DEMOLITION

Demolition and Remodeling

Consideration for Conservation of Trees: The Northwest campus is the site of the Missouri State Arboretum, so demolition and construction practices must be consistent with sound tree conservation practices.

All tree pruning and removals shall be conducted by or conducted under the supervision of an arborist certified under the “International Society of Arboriculture” certified arborist program. Any alternative certifications must be approved by Northwest’s Landscape Services Manager and/or Arboretum Director.

- END OF SECTION –

02 80 00 - Facility Remediation

02 80 10 General Information

Northwest's goal is that all renovated buildings and/or spaces be 100 percent free of hazardous materials, including, but not limited to; Asbestos, PCB, and Lead. Do not cover known Asbestos Containing Materials, unless approved in writing, in advance, by the Northwest Authority Having Jurisdiction (AHJ).

- END OF SECTION -

Division 3 - Concrete

03 30 00 - Cast-in-Place Concrete

03 30 10 General Information

1. Uniformly slope surfaces to drains. Slabs and other surfaces that do not drain appropriately will not be accepted.
2. Coordinate the installation of joint materials, vapor retarder, and other related materials with placement of forms and reinforcing steel.
3. When specified, place vapor retarder sheeting in position with longest dimension parallel with direction of pour.
4. Avoid cutting or puncturing vapor retarder/barrier (when such is used) during reinforcement placement and concreting operations.
5. See Section 313100 "Soil Treatment" for termite control specifications pertaining to concrete.
6. See Section 321000 "Bases, Ballasts, Pavements and Appurtenances" for exterior concrete paving and sidewalk guidelines.

Building Egress

Provide footings for flat work at all entry and exit doorways. Any sidewalk or flatwork that occurs within the radius of a door swing shall have footings around its perimeter. This footing will either be integral to the footings and foundation of a new structure or pinned/doweled to the footings of an existing structure. This footing shall be extended below frost line to prevent heaving of concrete at building entries/exits.

Equipment Bases and Foundations

Provide equipment bases and foundations as required. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment. See

Minimum Depth

All new exterior concrete shall be of a minimum depth of 6 in. unless otherwise specified by the following: Architect, Northwest Landscape Services, and Northwest Project Manager.

Color

When colored concrete is specified, color shall be added during mixing in order to provide uniform distribution throughout the pour. Any other technique must be approved by Northwest Project Manager and A/E if applicable.

03 31 00 STRUCTURAL CONCRETE

Reinforcing

All concrete shall be steel reinforced concrete unless otherwise specifically called out as unreinforced; any deviation shall be as approved by Northwest Project Manager and AE if applicable. Reinforce all concrete not otherwise shown with the same steel as in similar sections or areas.

If reinforcement is required the reinforcement shall be supported on chairs and located uniformly at mid-depth of the slab.

1. Repair damages before placing concrete. Accurately position, support, and secure reinforcement against displacement.
2. Install welded wire fabric, or a Northwest-approved substitute of equal caliber, in lengths as long as is practical. Set wire ties so that ends are directed into concrete, not toward exposed concrete surfaces.

Pinning/Doweling

Where new concrete is poured, use No. 5 reinforcing bar, pinned (inserted) a minimum of 6 in. into the existing adjacent concrete, 24” o.c. maximum or as required by the drawings.

Construction Joints

Locate and install construction joints so that they do not impair strength or appearance of the structure, as acceptable to Northwest Facility Services and AE, if applicable.

1. Locate construction joints at mid span (middle third) unless noted otherwise. Provide 2-by-4 horizontal keys at construction joints for shear transfer.
2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

Contraction (Control) Joints in Slabs-on-Grade

Use saw cuts 1/8 in. wide by one-fourth of slab depth or inserts ¼ in. wide by one-fourth of slab depth, unless otherwise indicated.

1. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
2. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and to not more than 225 square feet. Located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

Placement, concrete

General: Comply with ACI 301, "Specifications for Structural Concrete," and as specified. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. All concrete shall be poured properly (such as performing vibration to remove air bubbles, etc.) in order to provide a smooth finish on non-walk surface.
4. All voids shall be filled with appropriate material, approved in advance by the Northwest Project Manager and Northwest Facility Services, while concrete is still green.

   (The above filling shall be allowed only for minor imperfections.)
   (Any gross numbers of imperfections will not be accepted.)
5. Northwest's standard is to accept only smooth finish surfaces. Improper installation shall be removed at cost of the Contractor.
6. Maintain reinforcing in proper position on chairs during concrete placement.

Hot-Weather Placement: When pouring concrete in temperature conditions above 90 degrees F, use proper hot weather techniques including, but not limited to, the following:

1. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform, without puddles or dry areas.
2. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Owner.

Cold-Weather Placement: When pouring concrete in temperature conditions below 40 degrees F or forecast to drop below that temperature within 24 hours of the time concrete is to be placed, use proper cold weather techniques.

Curing and Sealing

All new concrete shall have a curing and sealing compound applied in order to protect the surface. The compound shall be applied when all free water has disappeared and the surface cannot be marred. Apply the compound without delay, in a uniform manner (without puddles), and using low-pressure spray, roller, or brush. Do not thin the product.

1. Curing/sealing compound shall be HydroWhite or approved equivalent, as manufactured by Symons Corp.

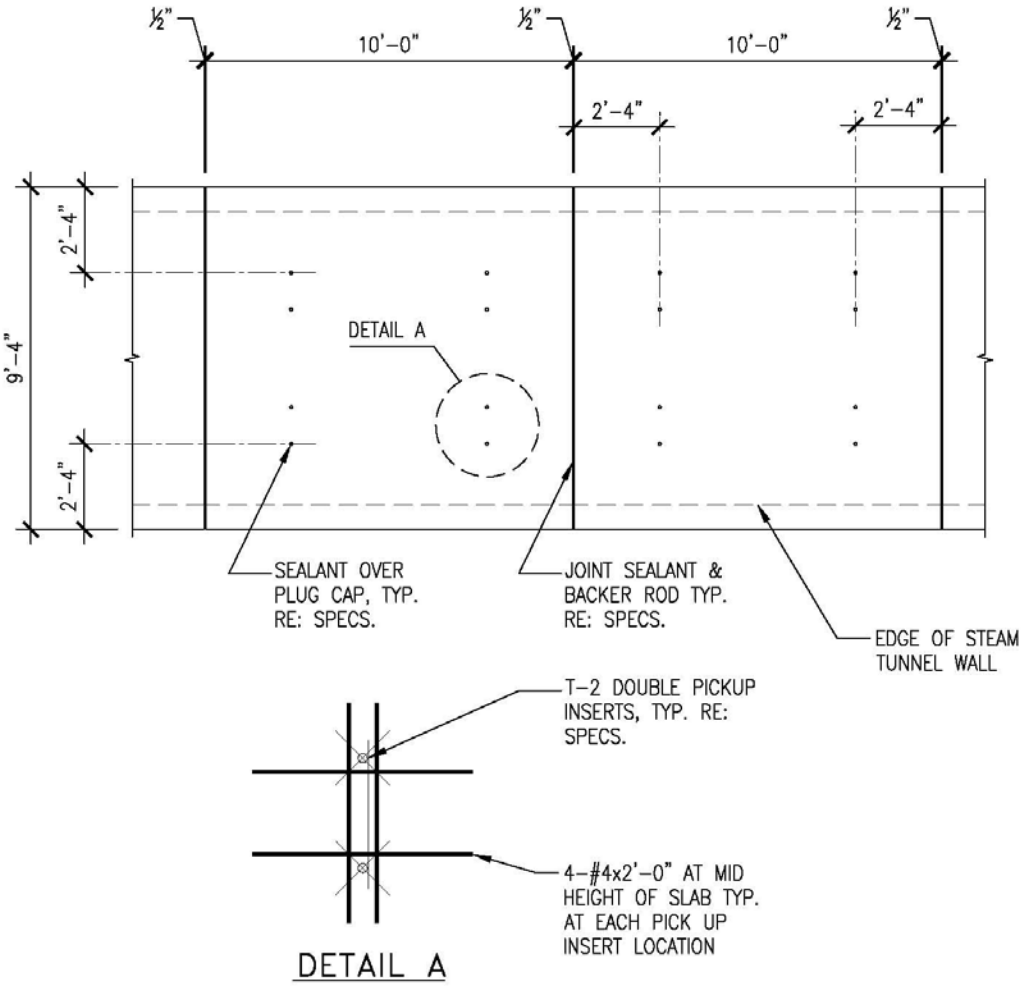
Campus Utility Tunnel Specifications

Although the dimensions of the tunnel may vary with the size and number of utilities it is to contain, the following is a guide to the general construction of campus utility tunnels:

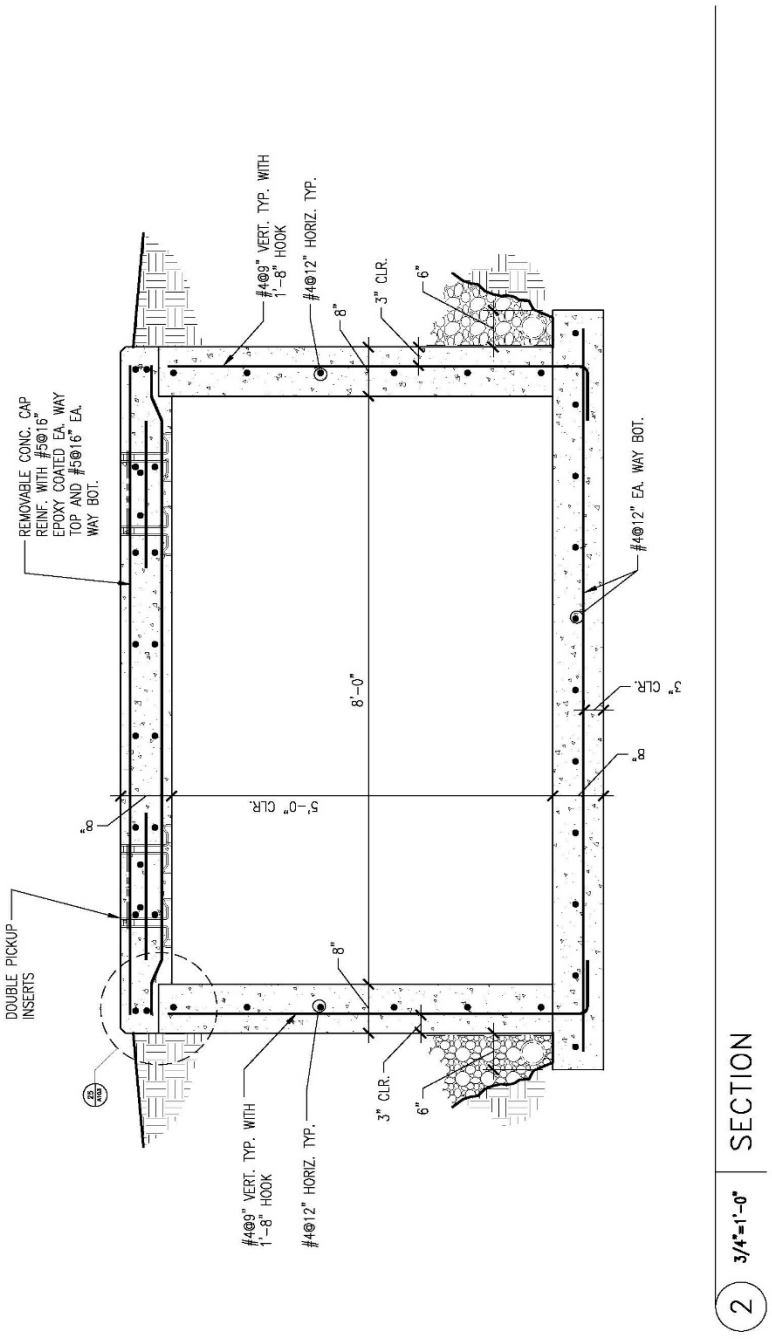
1. The tunnel walls and floor are to be cast in place at elevations and dimensions indicated in design plans and specifications (see details 1, 2, and 3 that follow).
2. The tunnel tops are to be pre-cast units, not to exceed 10 feet in length. Custom sizes may be required to match lengths of tunnel run.
3. Each tunnel top shall be cast with T-2 Double Pickup Inserts (Dayton-Richmond Concrete Accessories) installed so as to allow removal and placement of tops for access to utilities within the tunnel.
4. Cast in place tunnel tops are only to be used with approval from Northwest Design and Construction. Otherwise all tunnels shall be designed with removable tops.
5. Tunnel designs must include access doors in critical locations.
    - *See Section 055400 "Metal Floor Plates" for specifications regarding traffic access doors.*
6. Locations will be determined by the tunnel system designer with approval by Northwest Design and Construction.

Lifting and Handling Inserts for removable concrete panels shall be as follows:

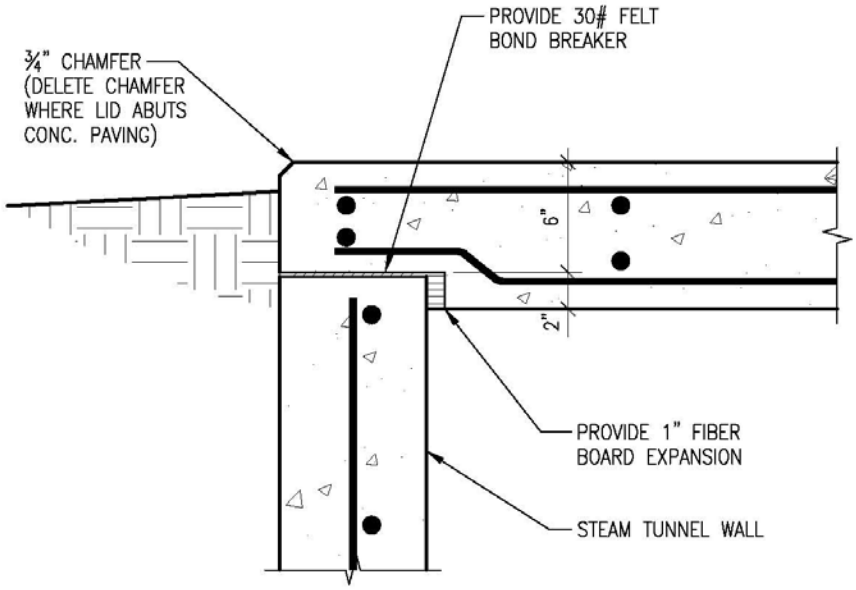
- T-2 Double Pick-Up Insert
- .375" diameter leg wires
- Stainless steel tips
- 1-inch coil diameter for 8-inch slab thickness
- 8,000 lbs minimum working load
- Plastic Insert plugs installed


½"
10'-0"
½"
10'-0"
½"
2'-4"
2'-4"
2'-4"
9'-4"
2'-4"
DETAIL A
SEALANT OVER PLUG CAP, TYP. RE: SPECS.
JOINT SEALANT & BACKER ROD TYP. RE: SPECS.
EDGE OF STEAM TUNNEL WALL
T-2 DOUBLE PICKUP INSERTS, TYP. RE: SPECS.
4-#4x2'-0" AT MID HEIGHT OF SLAB TYP. AT EACH PICK UP INSERT LOCATION
DETAIL A

1 1/4"=1'-0" PLAN



2 3/4"=1'-0" | SECTION



3 1 1/2"=1'-0" | DETAIL

03 35 00 CONCRETE FINISHING

Chemically Stained Concrete

All stained concrete products and installers must meet or exceed the following requirements:

Manufacturer's Qualification: Not less than 10 years experience in the actual production of specified products.

Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following:

1. Acceptable to or licensed by manufacturer.
2. Not less than 3 years experience with systems.
3. Successfully completed not less than 5 comparable scale projects using this system.

Floor Stain: Water based solution of metallic salts containing no resin.

1. Approved manufacturer: L.M. Scofiend Company: Lithochrome Chemstain
2. Comparable products by other manufacturers are acceptable with prior approval by the Architect.

Seal Coat: Water based modified methyl-methacrylate clear emulsion.

1. Approved manufacturer: L.M. Scofield
2. Approved Product: Scofield Selectseal-W (acrylic-polyurethane sealer)
3. Comparable products by other manufacturers are acceptable with prior approval by the Architect.

Final Coat: Provided by Northwest

1. Approved manufacturer: EcoLab Superior 30
2. Installation: minimum of three (3) coats

-END OF SECTION-

Division 4 - Masonry

04 01 00 - Maintenance of Masonry

04 01 40.52 STONE CLEANING

Stone shall not be cleaned by any sandblasting methods. Instead, chemical cleaning methods shall be employed.

1. Any areas below areas cleaned shall be properly protected and washed thoroughly upon completion of the cleaning process.
2. Proper protection for landscaping, nearby structures and vehicles must be provided for cleaning processes.

- END OF SECTION –

04 05 00 - Common Work Results for Masonry

04 05 10 General Information

Brick used on exterior surfaces shall be glazed in such as way to repel moisture. (Avoid porous surfaces)

- Exterior brick surfaces shall have properly installed weeps and weep holes. **(See 042000 Unit Masonry)**
- Waterproofing must be approved by Northwest Facility Services.
- All masonry installations (exterior and interior) shall have adequate anchors and expansion joints. Such items shall be inspected by project Architect/Engineer and reviewed by the Northwest Project Manager to assure proper installation.
- Capstone spacing must be coordinated with any handrail, guardrail or mechanical attachments to avoid spanning control or expansion joints with such items.

- END OF SECTION –

04 20 00 - Unit Masonry

04 20 00 UNIT MASONRY

Project Conditions

Cold Weather Construction: If cold-weather construction is required, comply with requirements of the International Building Code, Chapter 21, for cold-weather construction and the following:

1. Do not lay masonry units that are wet or frozen.
2. Remove masonry damaged by freezing conditions.
3. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements:
    a. For units with surface temperatures above 32°F (0°C), wet with water heated to above 70°F (21°C).
    b. For units with surface temperatures below 32°F (0°C), wet with water heated to above 130°F (54°C).
4. Perform the following construction procedures while the work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10°F (6°C):
    a. 40°F (4°C) to 32°F (0°C):
    Mortar: Heat mixing water or sand to produce mortar temperature between 40°F (4°C) and 120°F (49°C).
    Grout: Follow normal masonry procedures.

    b. 32°F (0°C) to 25°F (-4°C):
    Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.
    Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of work day.

    c. 25°F (-4°C) to 20°F (-7°C):
    Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.
    Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of workday.
    Heat both sides of walls under construction using salamanders or other heat sources.
    Use windbreaks or enclosures when wind is in excess of 15 mph.

d. 20°F (-7°C) and below:
   Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
   Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of workday.
   Masonry Units: Heat masonry units so that they are above 20°F (-7°C) at time of laying.
   Provide enclosure and auxiliary heat to maintain an air temperature of at least 40°F (4°C) for 48 hours after laying units.

e. Do not heat water for mortar and grout to above 160°F (71°C).

5. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry temperature ranges apply to anticipated minimum night temperatures:

   a. 40°F (4°C) to 25°F (-4°C):
      Cover masonry for at least 48 hours after construction with weather-resistive membrane.

   b. 25°F (-4°C) to 20°F (-7°C):
      Completely cover masonry with weather-resistive insulating blankets or provide enclosure and heat for at least 48hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mph.

   c. 20°F (-7°C) and below:
      Provide enclosures and supplementary heat to maintain masonry temperature above 32°F (0°C) for 48 hours after construction within the enclosure using salamanders, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.

6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40°F (4°C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100°F (38°C) and above.

Miscellaneous Masonry Accessories

1. Nonmetallic Expansion Joint Strips: Premolded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

    a. Neoprene

2. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. asphalt felt).

3. Weep/Cavity Vent Products: Provide from the following:

    a. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

        -- OR –

    b. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

4. Cavity Drainage Material: Free-draining mesh, made from polyethylene strands and shaped to avoid being clogged by mortar droppings.

    a. Size: Provide the following thicknesses at the indicated cavities: 2-inch thickness

        i. Brick with wood stud and sheathing: One (1) layer 2-inch thickness.
        ii. Brick with concrete wall back-up: One (1) layer 2-inch thickness.

    b. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
        i. Mortar Break; Advanced Building Products, Inc.
        ii. CavClear Masonry Mat; CavClear.
        iii. Mortar Net; Mortar Net USA, Ltd.
        iv. Mortar Stop; Polytite Manufacturing Corp.

5. Building Paper: Where indicated and in all cavity wall locations in which masonry veneer is backed up by wood stud wall, provide continuous barrier of 30 lb. felt paper to exterior face of gypsum board sheathing. Shingle sheets horizontally such that higher layers overlap lower layers by a minimum of 12 inches.

- END OF SECTION -

Division 5 - Metals

05 05 00 - Common Work Results for Metals

05 05 10 General Information

- Exposed Metal: All metal exposed to view or subjected to moisture shall be either galvanized steel, aluminum or stainless steel. The Owner will choose, from the following, the coating required for the use of such metal: prime and final painting, porcelain enamel coating, powdered coating or an anodized finish. Any exception must be approved by Northwest Facility services.

- Factory (Red Iron) primer will not be accepted as a finish base primer for steel, including but not limited to railings, stairs, and beams. All exposed steel specified for finish coating must be primed in accordance with final coating priming requirements. Any exceptions must be approved by Northwest Facility Services.

- Stainless Steel: Finish of exposed stainless steel (e.g. plates under doors, rails, access doors) shall not be polished. In lieu of such finish, brushed (i.e. satin) finish shall be used.

05 50 00 - Metal Fabrications

05 51 00 Metal Stairs

- Ladders: Fixed ladders and replacement ladder/ladder sections must have a ladder safety or personal fall protection system if 24 feet in height or greater. Such cages shall be of galvanized steel or aluminum and shall be properly coated, according to the discretion of Northwest Facility Services.
- All fixed ladders must be equipped with OSHA approved extendable safety post and be fully OSHA compliant.

05 52 00 Metal Railings

- All handrails and railings must comply with the ADA and ABA Accessibility Guidelines.
- Handrails and Railings: Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2 inches minimum.
    1. Exterior metal railings shall be aluminum or stainless steel. Such shall be painted, powder-coated or anodized depending on the application; powder coating shall be approved by Northwest Facility Services.
    2. Handrails shall be anchored to vertical surface whenever possible.
    3. When vertical anchoring is not possible a horizontal surface mounted anchor may be used. Anchors shall be a minimum of 3-inches from joints or edges of concrete or masonry units.
    4. Handrail, guardrail and other such mechanical devices shall be coordinated with masonry joints. Railing penetrations shall not occur within 3-inches of a stone or cast concrete joint.
    5. Handrails, guardrails and mechanical devices shall have a caulk that allows for expansion and contraction of dissimilar materials at anchor points.

Approved Products:

- Hollaender Speed Rail
- Hollaender Interna-Rail
- Hollaender A.D.A. Railing System

05 53 00 METAL GRATINGS

- All metal grates in pedestrian or traffic ways must be approved by Northwest Facility Services. Such shall be flush with the surface, slip-resistant and of non-trip design.
    1. Grates in pedestrian areas must meet ADA 2010 standards, meaning a ½ inch ball cannot pass through the openings. These grates shall also be able to withstand the weight of light commercial vehicles.
    2. Grates in trafficways shall be crosshatched in such a way as to prevent bicycle tires from catching or being damaged. Roadway grates shall be designed to withstand commercial traffic.

05 54 00 METAL FLOOR PLATES

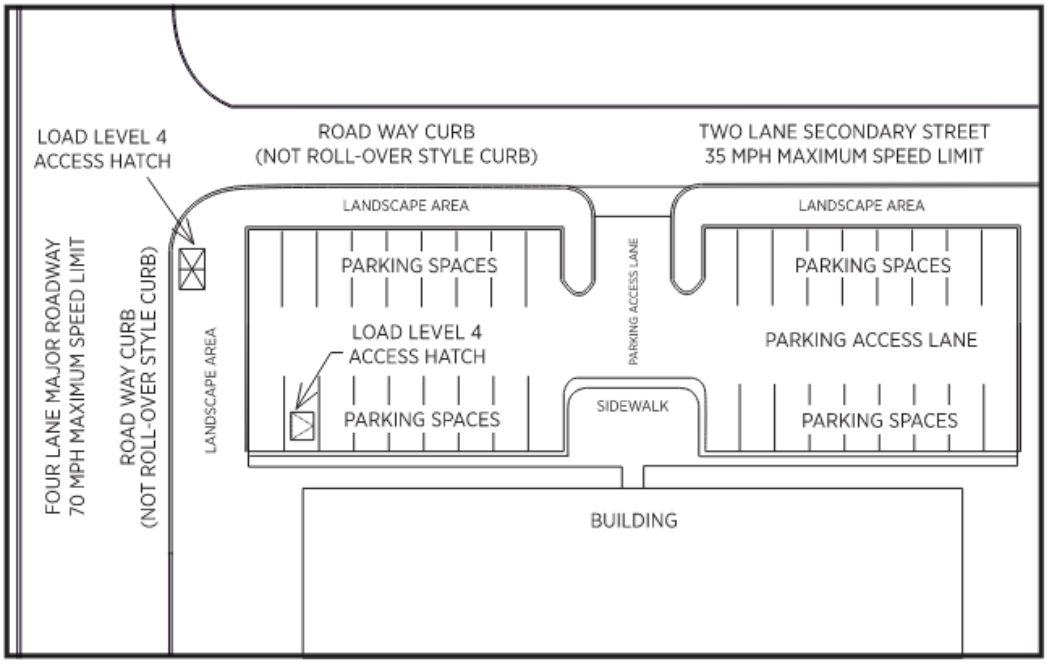
- All metal floor plates in pedestrian or traffic ways must be approved by Northwest Facility Services. Such shall be flush with the surface, slip-resistant and of non-trip design.

Traffic Doors

- Access Doors for tunnel tops shall be Halliday Products H1W, model H1W2442, or equal as approved by Northwest Facility Services for ASTM C1802 Load Level 4 or lower. See (FIG. 1) below. Access doors for heavier load levels shall be approved by Northwest Facility Services during design.

FIGURE 1

LOAD LEVEL 4



Occasional Truck Traffic

Restricted to parking spaces and areas within close proximity of roadways

- END OF SECTION-

Division 6 - Wood and Plastics

06 10 00 - Rough Carpentry

06 11 00 WOOD FRAMING

- Additional framing shall be included in stud walls for the following:
    - Blocking for wall mounted door stops
    - Blocking for magnetic hold open devices
    - Attachment of heavy duty shelving
    - Attachment of wall mounted cabinets
    - Attachment of restroom partitions
    - Attachment of interior handrails
    - See Section 087100 Door Hardware for specifications regarding additional reinforcement/framing.

- Exposed wood framing components or structural members shall be pressure treated. Exposed laminated wood members shall be pressure treated and sealed.

06 15 00 WOOD DECKING

- Exposed wooden elements (decking/posts) shall be only pressure treated lumber (AWPA U1, current edition compliant), redwood or cedar.
    - Fasteners shall be carefully specified to be compatible with preservative treatment specified.
- Manufactured synthetic decking shall only be specified if approved by Northwest Facility Services.

06 16 00 SHEATHING

- Fastening Methods: Wood screws shall be used in conjunction with construction adhesive to attach subflooring.

. - END OF SECTION -

06 40 00 - Architectural Woodwork

06 40 10 General Information

- There shall be no unfinished surfaces on tops or sides of tables, countertops or cabinetry.
- All plastic laminates shall be a minimum thickness of .050 inches Wilsonart LLC in compliance with current color standards, or Northwest Facility Services approved equal. See Appendix B.
  - Horizontal Surfaces: Grade HGL
  - Postformed Surfaces: Grade HGP
  - Vertical Surfaces: Grade VGS
  - Edges: Grade HGS
- Plastic laminates shall have a semi-gloss or gloss finish for ease in cleaning. Any deviation from such must be approved by Northwest Facility Services.
- Pre-finished woodwork/In-field finish: Provide pre-finished woodwork where possible. Where in-field finish must be performed, coordinate environmental concerns, ventilation requirements, shutdowns, etc. with Northwest Facility Services.

06 41 00 Architectural Wood Casework

Cabinetry Door Hinges

- Cabinetry shall be European Style Cabinets (Frameless with concealed hinges). Concealed Hinges shall be one piece and may not use a spring clip or snap for assembly or adjustment.

- END OF SECTION -

06 61 00 – Cast Polymer Fabrications

06 61 16 Solid Surfacing Fabrications

- All solid surface countertops shall be US Surface Warehouse; Livingstone in compliance with current color standards, or Northwest Facility Services approved equal. See Appendix B.
- Solid surfacing shall have a semi-gloss finish for ease in cleaning. Any deviation from such must be approved by Northwest Facility Services.

- END OF SECTION -

Division 7 - Thermal and Moisture Protection

07 10 00 - Dampproofing and Waterproofing

07 17 00 BENTONITE WATERPROOFING

- Below-grade foundation walls and all masonry work shall be damp-proofed and /or waterproofed to meet design requirements and site requirements.

- Bentonite Waterproofing shall be used for sealing all exterior subterranean concrete walls.

    - Voltex roll material and/or Volclay panels are recommended. All other brands must be approved by Northwest Facility Services.

- END OF SECTION -

07 20 00 - Thermal Protection

07 22 00 ROOF AND DECK INSULATION

- Rigid PolyISO (Polyisocyanurate) Roof Insulation: Insulation boards shall be FM listed under roof system and meet ASTM C1289, Type II, Class 1 requirements.
    - Atlas Roofing Corp., ACFoam II
    - NRG Barriers, Inc., ENRGY
    - GAF Building Materials Corp., GAFTEMP Isotherm R
    - or Northwest Facility Services approved equal compatible with roofing manufacturer membrane.

- High Density Fiberboard Insulation:
    - Insulation board shall be FM listed under Roofing Systems.
    - Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the topside.
    - Board size 4'x4' and minimum ½" thickness.
    - Celotex, Temple Inland, GAF Building Materials Corp., or Northwest Facility Services approved equal.

- Gypsum Coverboard:
    - ASTM C1177, glass-mat, water-resistant gypsum substrate, ½" thick.
    - Certainteed, Glasroc; Georgia-Pacific, Dens Deck; National Gypsum, Gold Bond eXP Extended Exposure Sheathing; Temple-Inland, GreenGlass Exterior Sheathing; USG, Securock Glass Mat Roof Board or Northwest Facility Services approved equal.

- END OF SECTION –

07 40 00 - Roofing and Siding Panels

07 40 10 General Information

- Gypsum board shall not be used for any exterior surfaces, including walls, soffits, or eaves.

- The majority of structures on campus have masonry exterior. Any exterior siding should match or reflect this appearance. Any siding other than brick, split face concrete masonry or ground face concrete masonry must be approved by Northwest Facility Service.

07 46 00 Siding

Metal Siding

- Metal Siding shall be secured no less than at 4-ft. intervals both vertically and horizontally.

- END OF SECTION -

07 50 00 - Membrane Roofing

07 50 10 General Information

- For full roof replacement projects, all existing roofing and insulation materials shall be removed down to the deck.

- Roofing shall be either modified bituminous membrane roofing with white granular surfacing or shall be Ethylene Propylene Diene Monomer (EPDM) and must carry a minimum of 20 years zero cost manufacturer warranty. Approval of the membrane type shall be obtained from Northwest Facility Services.

- Any roof resurfacing must also carry a minimum 20-year zero-cost warranty and must be approved by Northwest Facility Services.

- All roof systems shall be limited to the following manufacturers, unless approved by Northwest Facility Services in writing in advance:

    - Modified Bituminous:
        - Elevate
        - GAF Building Materials Corp
        - Johns Manville Corp
        - Soprema Inc.
        - Tremco Inc
        - Siplast, Irving TX
    - EPDM
        - Carlisle Syntec, Inc.
        - Elevate
        - GenFlex
        - Johns Manville Corp

- Additional length warranties shall be considered during the design phase with final length of warranty to be approved by Northwest Facility Services.

- Northwest reserves the right to cut test panels from the finished roof to determine that minimum requirements have been met. The roofer shall repair, at Northwest's expense, the roof where test panels were taken if test panels conform to the specifications. If test panels do not conform, the Contractor will assume all costs.

- Unless otherwise approved by Northwest Facility Services, roofs shall be designed for maintenance access only.

- END OF SECTION -

07 60 00 - Flashing and Sheet Metal

07 60 10 General Information

- The specifications and details of the National Roofing Contractors Association shall be used as guidelines for all roof flashing systems.

- All flashing shall have a minimum height of twelve inches (12") above finished roof membrane.
- On Multi-level Roof Transitions on Brick-veneered Buildings, where flashing is installed that attaches to the interior support wall (usually block), passes through the veneer layer, and/or transitions to the termination bar of the modified bituminous roof. Weep holes shall be installed at this transition.

07 61 00 Sheet Metal Roofing

Although not an accepted normal standard, whenever a project has received approval for metal roofing, the following standards shall apply:

1. Minimum gauge of such shall be 24 (when roofing over wooden or concrete decks)
2. Metal roofing without a wooden or concrete deck shall be used only when approved by Northwest Facility Services.

- END OF SECTION –

07 70 00 - Roof and Wall Specialties and Accessories

07 72 00 ROOF ACCESSORIES

Roof Hatches

Only prefabricated, OSHA-approved roof hatches shall be installed. Such shall be installed on manufactured curbs.
Access to roof hatches shall have integrated safety railing system and a metal ladder with a minimum offset from the support wall of 8-inches. All ladders must be equipped with OSHA approved extendable safety post and meet standard given in *section 055100 Metal Stairs and Ladders*. Ship stair or service stair access options shall be considered with Northwest facility services input.

Roof Walkways

Roof walkways shall be installed where deemed necessary by Northwest Facility Services. Walkways shall follow logical travel patterns. Installation of such shall be according to the following specifications, using the indicated product or an approved equal by Northwest Facility Services:

1. Walkways can be constructed from two plies of mop or torch grade Ruberoid membranes. Construct walkways prior to application of finished field surfacing (as required), by solidly adhering a first ply of Ruberoid 20 (smooth) or Torch (smooth) membrane directly to the roof surface. Adhere a top ply of Ruberoid Mop Plus or Torch Plus (granule) membrane directly to the surface of the first ply. Do not mix Ruberoid Mop and Torch membranes.
2. The walkway sections shall be no longer than 10 ft. Leave approximately 6 in. between each of these sections to allow proper drainage. Install these pads the same days as the roofing membrane. Surface the roof around and between these pads, making sure that the selvage edge of the Ruberoid Mop Plus or Torch Plus (granule) membrane is covered. These walkways are for normal rooftop foot traffic – not for sidewalk or patio-type use.

Manufactured Curbs

Height of such shall be a minimum of 10-inches.

07 76 00 ROOF PAVERS

Roof pavers shall not be used as part of the standard construction process, unless approved by Northwest Facility Services. If approved they must be installed with pinning and supports per section 321400 Unit Pavers

- END OF SECTION –

07 80 00 - Fire and Smoke Protection

07 84 00 FIRESTOPPING

All penetrations through floors and fire rated ceilings and walls are required to be fire caulked. Caulking shall not exceed ¼-inches thick. Firestopping design shall be in accordance with a published UL approved system.

- END OF SECTION –

07 90 00 - Joint Protection

07 90 10 GENERAL INFORMATION

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

- END OF SECTION-

-

Division 8 - Openings

08 05 00 - Common Work Results for Openings

08 05 10 General Information

- Usage of equipment manufactured by Total Door or Won-Door shall be only as approved by Northwest Facility Services.
- Fire Doors: Such doors being installed in office complexes shall have vision glass; staircase fire doors shall have a vision plate (window) as part of the assembly unless automatic hold-open devices are employed.
- All public-access doors (i.e. classrooms, offices, conference rooms, etc.) shall have a vision plate or a sidelight.
- Window Screens: Such shall be metal.
- Any pairs of doors shall use key removable mullions.
- Buildings utilizing electronic access must have only electronic access to the controlled area. Any other door entering or exiting that controlled area cannot be supplied with mechanical key devices.

- END OF SECTION –

08 11 00 - Metal Doors and Frames

08 11 13 Hollow Metal Doors and Frames

Acceptable Manufacturers

Subject to compliance with requirements, manufacturers offering standard steel doors and frames which may be incorporated in the-work include; but are not limited to, the following: Amweld Building Products, Inc., Ceco Corp., Curries Company, Pioneer Industries, Republic Doors and Frames, and Steelcraft Manufacturing Co.

Adjust and Clean

Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

Doors

Edge Seam: T-edge, continuously welded the full height of the door, finished smooth with no visible seams.

Perimeter Channel: .067" continuous

Thickness: 1¾-in.

Face: 18 gauge (.042")

Galvanized: A60 exterior

Core: R-12 polyurethane, honeycomb

Fabrication

Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp, or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment to assure proper assembly at project site. Fabricate exposed faces of doors and panels from only cold-rolled steel.

1. Clearances: Not more than 1/8-in. at jambs and heads except between non-fire-rated pairs of doors not more than ¼-inches; Not more than ¾-inches. at bottom.

Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel. Fabricate doors, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door- construction or by addition of minimum 16-gauge (.053") inverted steel channels.

Fasteners, Exposed: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

Frames: Patching and repairing of existing frames to remain:

1. Fill all holes left from existing hardware that will not be reused.
2. Fill all dents and scrapes in existing frames.
3. Sand smooth for new paint.

Hardware Preparation: Prepare doors and frames in accordance with final Door Hardware Schedule and templates provided by hardware supplier.

1. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at project site.
2. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames," published by Door and Hardware Institute.

Painting by Factory: Pre-finish exterior door and frames as follows:

1. Preparation: Solvent clean to remove oil, grease, soils and other contaminants.
2. Prime: Series 66 or 69 Hi-Build Epoxoline 2.0-3.0 mils.
3. Intermediate: Series 27 F.C. Typoxy 2.0-3.0 mils.
4. Finish: Series 72 Endura - Shield 2.0-3.0 mils.
5. Specification is based on products manufactured by Tnemec. However, Northwest Facility Services approved equals may be used.

Painting by Shop: Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

Thermal-rated (Insulating) Assemblies: At exterior locations, provide doors fabricated as thermal insulating door and frame assemblies. Provide thermal-rated assemblies with U factor of 0.41 Btu (hr. x sq. ft. x degrees F.) or better.

Frames, borrowed lights

Provide metal frames for doors, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 18-gauge (.042”) cold-rolled steel. Fabricate frames with mitered, coped, or welded corners. Form exterior frames from 16-gauge (.053”), galvanized steel.

Door Silencers: Except on weather-stripped frames or fire-rated doors, drill stops to receive 3 silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

Plaster Guards: Provide minimum 26-gauge (.016”) steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

Installation

General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

Installation of Doors: Fit hollow metal doors accurately in frames.

Placing Frames: Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

1. In masonry construction, locate three wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry tee anchors, grout jambs full.
2. In metal stud partitions, install at least three wall anchors per jamb at hinge and strike levels. In closed steel stud partitions, attach wall anchors to studs with screws.
3. Locate minimum anchors at window wall entrance framing as required by the manufacturer to comply with model code wind loads.

Materials

Steel Sheets and Strip, Hot-rolled: Commercial quality carbon steel, pickled and oiled.

Steel Sheets, Cold-rolled: Commercial quality carbon steel.

Steel Sheets, Galvanized: Zinc-coated carbon steel sheets of commercial quality.

Supports and Anchors: Fabricate of not less than 18-gauge (.053”) sheet steel, galvanized where used with galvanized frames.

Inserts, Bolts, and Fasteners: Manufacturers standard units. Where items are to be built into exterior walls, hot-dip galvanize.

Paint, Shop-applied: Apply after fabrication.

1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.
2. Finish Coat: No metal doors shall be left with only a prime coat. Any doors that do not have a factory-applied finish coat shall be given two coats of finish paint, color as determined by drawings or Northwest Facility Services.

- END OF SECTION -

08 14 00 - Wood Doors

08 14 10 General Information

- Hollow-core wood flush doors shall not be used unless approved by Northwest Facility Services.
- All wood doors shall be of 1¾-inch thickness and shall be prepared to receive a 2¾-inch backset lock.
- Wood doors shall not be modified in any manner to cause the weight of the door to exceed the frame and/or hinge support.
    - *See Supports for Plaster and Gypsum Board Section 092200 for related specifications*
    - *See "Hinges" in Section 087100 for related specifications*

08 14 16 Flush Wood Doors

Adjusting and Protection

Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

Damage to Finished Doors: Refinish or replace doors damaged during installation.

Operation, Adjusting: Re-hang or replace doors that do not swing or operate freely. All doors utilizing door closer mechanisms shall receive final adjustment after all HVAC air balancing is completed and door hardware is installed.

Examination

Examine installed door frames prior to hanging door.

Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb-jambs and level heads.

Reject doors with defects.

Do not proceed with installation until unsatisfactory conditions have been corrected.

Fabrication:

Hardware Preparation: Prepare doors and frames to receive hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier.

1. Reinforce doors to receive surface-applied hardware using a minimum top core width of 6-inches. Drilling for surface-applied hardware may be done at project site.
2. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Wood Doors and Frames," published by Door and Hardware Institute.

Flush Wood Doors, interior

Solid Core Doors: Comply with the following requirements:

1. Construction: 5 plies
2. Faces: Hardwood finish
3. Grade: A
4. Core: Particleboard or Gypsum with blocking at hinge, closer, panic and other stress areas. Refer to section 081416 Fabrication, item 1.
5. Rails: Top and bottom 1 3/8-inch
6. Thickness: 1¾-inch
7. Stiles: 1-3/8-inch minimum with 2-inch preferred, two-ply, laminated

Fire-rated Solid Core Doors: Comply with the following requirements:

1. Faces and Grade: Provide faces and grade to match non-rated doors.
2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated with blocking at hinge, closer, panic and other stress areas. *Refer to section 081416 Fabrication, item 1*.

Installation

Factory-finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

Factory-fitted Doors at New Door Frames: Align in frames for uniform clearance at each edge.

Job-fit Doors at Existing Frames to Remain: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors.

1. Fitting Clearances for Non-rated Doors: Provide 1/8-inch (3.2 mm) at jambs and heads, 1/16-inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8-inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch (6.4-mm) clearance from bottom of door to top of threshold.
2. Bevel fire-rated doors 1/8-inch in 2-inches. (3½ degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.
3. Bevel non-rated doors 1/8-inch in 2-inches (3½ degrees) at lock and hinge edges.

Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.

Light Frames

Beads, Wood-veneered, for Light Openings: Manufacturer’s standard wood veneered steel beads matching veneer species of door faces and approved for use in doors of fire rating indicated where required.

Manufacturers

Subject to compliance, provide solid core doors by one of the following:

1. Algoma Hardwoods Inc., Buell Door Company, Eggers Industries – Architectural Door Division, Essex, Fenestra Corporation, Marlite, Mohawk Flush Doors, Inc., VT Industries, and Weyerhauser Co.

Veneer Matching

Within Door Faces: Provide doors with book matching central balance veneer.

08 14 29 PREFINISHED WOOD DOORS

Factory Finishing

General: Comply with referenced quality standard's requirements for factory finishing.

Finish wood doors at factory.

Finish, Transparent: Comply with requirements listed below.

1. Effect: Filled finish.
2. Finish: Manufacturer's standard finish with performance requirements comparable to either AWI-6 catalyzed lacquer or AWI System TR-4 conversion varnish.
3. Grade: Premium.
4. Sheen: Satin.
5. Staining: VT Industries Timber TI18 or Facility Services approved substitute.

- END OF SECTION –

08 17 00 - Integrated Door Opening Assemblies

08 17 13 Integrated Metal Door Opening Assemblies

Doors and frames shall meet the standards as specified under section 081100.

Coating

Pre-assembled metal door units shall be primed and finish-coated by the manufacturer.

- END OF SECTION –

08 30 00 - Specialty Doors and Frames

08 31 00 Access Doors and Panels

Access doors and panels shall be located in such a way as to allow the unit to operate. Doors and panels shall be of adequate size to allow proper maintenance.

1. Doors and panels shall be installed wherever there are concealed valves and fire dampers.

All control devices, specialties, valves, dampers, etc., shall be so located as to provide for easy access for adjustment and maintenance.

Provide Milcor, Titus, Nystrom, or Facility Services approved equal access doors for all concealed control devices, except those mounted above lay-in ceilings.

Access doors shall be adequately sized for the devices served with a minimum size of 24 by 24 inches. Any deviation from such shall be only as approved by Northwest Facility Services. Access doors shall be of proper construction for type of construction where installed, similar to Milcor Type "M" #3202-030, with 14-gauge baked enamel pan. In areas where tampering may be an issue, a key-lockable panel shall be installed. Doors shall be prime coated for painting by others.

The exact location of all access doors shall be verified with Northwest Facility Services prior to installation.

08 33 23 Overhead Coiling Doors

Overhead doors shall be of commercial grade and shall have coil springs. Tracks shall be installed in such a way as to not inhibit vehicular traffic inside the structure.

Overhead doors at exterior locations shall be rated for high wind speed V=118 mph.

08 38 00 Traffic Doors

Access Doors (non-traffic rated) for tunnel tops shall be Halliday Products H1W, model H1W2442 or Northwest Facility Services approved equal. *See section 055400 Metal Floor Plates.*

- END OF SECTION –

08 40 00 - Entrances, Storefronts, and Curtain Walls

08 41 00 ENTRANCES AND STOREFRONTS

- Entry and exit hardware for Entrances and Storefronts shall be installed per specifications in Section 087000.
    - *See Section 087100 for Door Hardware specifications*
- Glass Entrances and Storefronts: All exterior glass shall be, at minimum, double-glazed and either tempered or laminated in order to meet current code.

- END OF SECTION –

08 50 00 - Windows

08 50 10 General Information

- Windows shall be of commercial grade.
- Tilt-in, double-hung windows shall be used whenever such is appropriate for the design.
    1. It is preferred that all exterior window surfaces be designed for indoor cleaning.
    2. Screens: Screens shall be metal and easily removable or adjustable for cleaning.
- All glass surfaces shall be designed for ease of cleaning from both sides.
- Blinds: Internal, built-in mini blinds shall not be used.
- Hopper style window shall not be used without the approval of Northwest Facility Services.
- Sash limiters and special-tool/tamper-proof operation requirements shall be reviewed provided where required by Northwest Facility Services.

- END OF SECTION –

08 60 00 - Roof Windows and Skylights

08 60 10 General Information

Skylights shall not be used without the prior approval of Northwest Facility Services.

- END OF SECTION –

08 70 00 - Hardware

08 71 00 DOOR HARDWARE

Access Control Lockset, electronic

Exterior doors with electronic access shall be a multi technology keypad reader with latch retraction of the accessible door.

Approved electronic locksets are Schlage AD 300 or AD 400. Neither are to be used on the exterior of new construction.

Exterior openings with electronic access must include power supplies, controllers, interfaces, door position switches, latch retraction and request to exit managed by Vanderbilt SMS software.

Current credentials used: Schlage 9651 48X smart credential. (Provided by Northwest Facility Services)

Closers and Door Control Devices

Door Closers: Overhead, concealed door closers shall not be used. Instead, as per the door hardware schedule herein, hydraulic closers of Norton or LCN make shall be used. Whenever possible, building design shall be such that it minimizes usage of automatic door closers, with fire doors located as appropriate to meet or exceed NFPA standards.

Door Stops: Such shall be provided where necessary to protect walls. Flexible doorstops shall not be installed. Whenever possible, doors utilizing automatic closers shall employ automatic stops as part of the assembly. Doors stops shall be installed so as not to create tripping or cleaning hazards. Wall-mounted door or knob stops shall be properly reinforced within the wall structure in order to prevent damage to the wall.

- *See Section 061100 Wood Framing for blocking of wood devices.*

Hold-open Devices: Automatic hold-open devices shall be installed in conjunction with existing Northwest Simplex System, at minimum, on the following fire door locations: conference rooms, corridors, classrooms, and office complexes. Architect/Engineer shall review the location of all such devices with Northwest Facility Services. All wall mounted hold open devices shall have reinforcing in the wall at the point(s) of connection.

- *See Section 061100 Wood Framing for blocking of wood devices.*

Fasteners

Any exposed fasteners shall be of tamper-resistant design.

Finishes, door hardware

All door hardware shall be 626 finish.

Hardware, installation

Architect shall provide mounting heights that comply with current ADA standards.

Hinges

Hinge Pins: Unless indicated, provide hinge pins as follows:

1. Out-swing Corridor Doors with Locks: Nonremovable pins
2. Tips: Flat button and matching plug, finished to match leaves
3. Exterior Aluminum Doors: Such shall have three pivot hinges per door or a continuous hinge – one that spans the entire length of the door. Butt hinges shall not be used.
4. Exterior Steel Doors – such shall have three butt hinges per door or a continuous hinge – one that spans the entire length of the doors.

Number of Hinges: Provide the number of hinges indicated but not less than three hinges per door.

Kickplates

Such shall be 626-brushed stainless steel and shall be installed on the push side of all doors unless otherwise approved by Northwest Facility Services.

Locks, Latches, Cylinders, etc.

Cylinders and Keying: Cylinders and keys for lever locks shall be provided by Northwest and installed by the Northwest Facility Services Lock Shop. Cylinders shall be of Medeco make and shall be bi-axle, 6-pin made to install in Schlage ND-series locks.

Lever Locks: Shall be of Schlage make, ND-series.

Deadbolt Locks: Lock and cylinder shall be of Medeco make and ordered sub-assembled for pinning by Northwest.

Stops: Doorstops shall be wall mounted concave type wall bumper or Northwest Facility Services approved equal.

Exit Device

Exit devices shall be No. 99 Von Duprin rim panic device. Pairs of doors shall use a key removable mullion. Any deviations must be approved by Northwest Facility Services.

Vertical Rod Exit Devices: Where no alternative exists, surface vertical rod exit devices may be used with approval by Northwest Facility Services. Concealed vertical rod exit devices shall not be used.

Radio-Controlled Switches for Automatic Door Openers

Radio-controlled switches for automatic door openers shall be 10-key and shall conform to Northwest's existing code system. Switches shall be powered directly from building electrical system. Power to switches must be from emergency circuits or supported by an approved battery back up. Structures that serve as housing or residences shall have at least one power assisted exterior door with the capability of operating from both building powered switches and radio controlled devices as per specification above. Door utilizing power assist must be designed and installed so that the electronic access control (FOB system) allows the access control to simultaneously activate the power assist mechanism.

Substitution Restrictions, door hardware

Door hardware shall conform to the substitution restrictions specified in the following table for compatibility with existing campus hardware:

Item Specified	*Manufacturer (No substitution allowed)*
Locking Hardware	Schlage ND
Access Control, electronic	Schlage
Closers, Interior	Norton Door Controls, Dor O Matic SC71
Closers, Exterior	LCN 4041 or Falcon
Cylinders	Medeco
Exit Devices	Von Duprin
Power-assist Door Openers	Dormakaba ED100LE

- END OF SECTION –

08 80 00 - Glazing

08 80 10 GENERAL INFORMATION

All exterior glazing installed shall be designed to withstand temperatures between negative 20 degrees F and 110 degrees F.

- END OF SECTION -

08 90 00 - Louvers and Vents

08 91 26 DOOR LOUVERS

Door louvers shall not be used unless approved by Northwest Facility Services.

- END OF SECTION –

Division 9 - Finishes

09 20 00 - Plaster and Gypsum Board

09 21 16 GYPSUM BOARD ASSEMBLIES

Framing and Furring, steel

Manufacturer: Shall be from the following:

1. Clark Dietrich Building Systems, LLC
2. Consolidated Fabricators Corp.
3. Marino/Ware Industries, Inc.
4. MBA Metal Framing
5. Other manufacturers subject to specification compliance

Grid Suspension Assemblies

Manufacturer: Shall be from the following:

1. Armstrong World Industries, Inc.
2. Chicago Metallic Corp.
3. USG Interiors, Inc.
4. Worthington Steel Company

Steel Framing for Walls and Partitions

General: Provide steel framing members complying with the following requirements:

1. Protective Coating: Such shall be hot-dip galvanized coating.

Deflection Track: Manufacturer's top runner with 2-in.- (50.8-mm-) deep flanges as required to prevent cracking of finishes.

Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

Fasteners: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; comply with the recommendations of gypsum board manufacturers for applications indicated.

Furring Channels, Steel – Rigid: Shall be hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 0.0179 in. (0.45 mm), unless otherwise indicated.
2. Depth: 1½ in. (38.1 mm).

Studs and Runners, Steel: Such shall have flange edges of studs bent back 90 degrees and doubled over to form 3/16-in.- (5-mm-) wide minimum lip (return) and shall comply with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 0.0179 in. (0.45 mm), unless otherwise indicated, for head runner, sill runner, jamb, and cripple studs at door and other openings.
2. Depth: 3 5/8 in. (92.1 mm), unless otherwise indicated; 6 in. (152.4 mm) where indicated; 2½ in. (63.5 mm) where indicated.

Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or non-slotted web, fabricated steel sheet, with a minimum base metal (uncoated) thickness of 0.0179 in. (0.45 mm), face flange of 1¼-in. (31.8 mm), wall-attachment flange of 7/8-in. (22.2 mm), and depth required to fit insulation thickness indicated.

Steel Framing Installation, general

Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishing, or similar construction. Comply with details indicated and with recommendations of board manufacturer or, if none are available, with United States Gypsum Company's "Gypsum Construction Handbook."

Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where partition framing and wall furring abut structure, install deflection track top runner to attain lateral support and to avoid axial loading.

Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

Trim Accessories, interior

Curved Edges: At such, use a corner bead formed of metal, plastic, or metal combined with plastic, with either notched or flexible flanges that are bendable to curvature radius.

Material: Formed metal or plastic, with metal complying with the following requirement: steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.

Shapes: Corner bead on outside corners, unless otherwise indicated; L-bead with face flange only, and flange formed to receive joint compound; use L-bead where indicated.

Trim Accessories, installation

General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

Control Joints: Install according to manufacturer's recommendations and in specific, approved locations for visual effect.

Corner bead: Install at external corners.

Edge Trim: Install where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated. Install L-bead where edge trim can only be installed after gypsum panels are installed.

Joint Treatment, materials

General: Provide joint treatment materials complying with the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

Drying Joint Compounds: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-mixed Formulation: Factory-mixed product; taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories; topping compound formulated for fill (second) and finish (third) coats; all-purpose compound formulated for both taping and topping compounds.

Joint Tape: Paper reinforcing tape, unless otherwise indicated.

Setting-type Joint Compounds: Factory-packaged, job-mixed, chemical-hardening powder formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only, or for taping and tilling only, use formulation that is compatible with other joint compounds applied over it.
2. For pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer.
3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, formulation recommended by gypsum board manufacturer.
4. For topping compound, use sandable formulation.

Cleaning

Remove spilled, splashed, or splattered compound from all surfaces; do so as work proceeds and upon completion. Do not mar surface finish of item being cleaned. Clean up of brushes, rollers and other materials should be done only in custodial or mechanical slop sinks.

Upon completion of work, leave premises in as good or better condition than when work was started.

09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD

- Metal Stud Assembly: Such shall use, at minimum, steel studs of 20-gauge. Provide ¾-in. channel with web horizontal at third points of partition height as continuous reinforcing. Weld, wire tie or screw to each stud. Provide additional reinforcing at hinge points adjacent to each side of door openings, extending from jamb stud for 32-in. minimum. At all openings, provide additional ¾-in. horizontal channels 6 to 12-in. above and below openings, extending 32-in., at minimum, beyond opening at each side.

- Provide reinforcing at all locations using a fire door "hold-open" device at doorstop.

- Provide reinforcing at all locations for all ADA handrails and toilet partitions and fixtures in restrooms.

- Provide reinforcing at all locations for scheduled shelving and/or cabinets, wall mounted projectors, monitors, etc.

09 22 26 SUSPENSION SYSTEMS

Grid Suspension System for Interior Ceilings

General: Such shall be manufacturer's standard direct-hung suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network. Ceiling shall be hung from structural members only and shall not be hung from ductwork, conduit, water lines or the like.

Channels, Steel Rigid – for Furring: Such shall be hat-shape with depth of 7/8 in. unless other otherwise indicated. Minimum thickness of base (uncoated) shall be as follows:

1. Thickness: 0.0179 in. (0.45 mm), unless otherwise indicated.
2. Protective Coating: Hot-dip galvanized coating.

Hangers, Angle-type: Angles with legs not less than 7/8-in. (22.2 mm) wide, formed from 0.0635-in- (1.6-mm-) thick galvanized steel sheet coating designation, with bolted connections and 5/16-in. (8-mm) diameter bolts.

Hangers, Wire: Class 1 zinc coating, soft temper, 0.162-in. (4.1-mm) diameter.

Wire Ties: Class 1 zinc coating, soft temper, 0.162-in. (4.1-mm) diameter.

09 29 00 GYPSUM BOARD

Manufacturers

Accepted gypsum board manufacturers are the following:

1. American Gypsum
2. Certainteed Corp.
3. Georgia-Pacific Corp.
4. National Gypsum Co.
5. United States Gypsum Co.

Accepted gypsum board manufacturers are the following:

1. Custom Building Products; Wonderboard.
2. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
3. USG Corporation; DUROCK Cement Board.
4. Northwest Facility Services approved equal.

Products

General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application. Provide gypsum board in widths of 48 in. (1219 mm).

Base Layer(s), Gypsum Board – for Multilayer Applications: Gypsum wallboard shall be as follows:

1. Type: Type X
2. Edges: Manufacturer's standard
3. Thickness: 5/8 in. (15.9 mm)

Cement Board: Such shall be finish water-resistant board forming base for wet locations to comply with manufacturer's directions for treatment of joints behind tile. Comply with the following:

1. Type: Type X
2. Thickness: ½ in. (12.7 mm)

Wallboard, Gypsum – High Abuse, High Impact: Shall be based on National Gypsum Products. Products of other manufacturers that meet or exceed the specified requirements are acceptable.

1. Type: Fire-Shield, Type X, Hi-abuse, Hi-impact XP board; Type X, sag-resistant type for ceiling surfaces
2. Edges: Tapered
3. Thickness: 5/8 in. (15.9 mm)
4. Impact Resistance: 840 ft.-lb.
5. Abuse Resistance: .003 surface abrasion at 1000 cycles

Application and Finish, general (initial)

Standards: Check that the following steps have been taken prior to and/or during installation:

1. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
2. Ceiling Board Panels: Install across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

Application and Finish, general

Gypsum Panels: Install with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16-in. (1.5 mm) of open space between panels. Do not force into place. Attach gypsum panels to steel studs so that leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first. Attach gypsum panels to framing provided at openings and cutouts.

Locate both edge and joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings when possible.

Application and Finish, Accessories and Trim

Corners: Gypsum board installation shall include the installation of protective corner guards.

Fasteners: Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations. Space fasteners in panels that are tile substrates at a maximum of 8-in. (203.2 mm) o.c.

Partitions, Gypsum Board: Isolate perimeter of non- load-bearing partitions at structural abutments, except floors, as detailed. Provide ¼- to ½- inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting surfaces with acoustical sealant.

Screws: Space screws at a minimum of 12 in. (304.8 mm) o.c. for vertical applications.

Finish

General: Treat gypsum board joints, interior angles, flanges of corner bead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.

Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish:

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 5 for gypsum board surfaces at all painted surfaces and surfaces to receive wall wraps.

For Level 5 gypsum board finish, all joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.

1. After painter has primed drywall, it shall be thoroughly inspected and its imperfections marked (e.g. tool marks, irregularities, ridges, etc.).
2. Repair walls with tinted drywall compound.
3. Request re-inspection by Northwest Facility Services.

Where Level 1 gypsum board finish is indicated, all joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

Finish cement board forming base for ceramic tile to comply with directions of gypsum board manufacturer for treatment of joints behind tile.

Texture Wall Finish

Texture Finish: Use only where approved by Northwest Facility Services. Apply texture finish in a uniform pattern that matches approved mockup and that is free of starved spots or other evidence of application patterns. Do not apply texture finish to walls to receive tile, restroom walls, soffits and ceilings.

1. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish.

Texture Ceiling Finish

Texture ceiling finish shall not be used.

- END OF SECTION –

09 30 00 - Tiling

09 30 10 General Information

- All tile shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.
- Tile shall be of industrial grade and resistant to yellowing and shall have neither rubber nor sulfur content.
- Neither plastic nor metal tile shall be used in any application.
- When used in high-traffic or entrance areas, a safety tread quarry tile shall be used.
- Dark colored grout is preferred.
- Portland cement-based mortars and grouts are the preference for installation of ceramic tile. However, if floor conditions are such that the use of an adhesive is necessitated, approval from Northwest Facility Services prior to installation is required.
- Mortars, grouts and adhesives may be chosen from, but are not limited to, the list of manufacturers below:

Dry-set mortars and grouts	***Organic adhesives, Type 1***
American Olean Tile Co., Inc. C-Cure Chemical Co. DAP Inc., Div.; USG Corp. L&M Mfg., Inc. Laticrete International, Inc. Summitville Tiles, Inc. TEC, Inc.	American Olean Tile Co., Inc. Custom Building Products C-Cure Chemical Co. DAP, Inc., Div.; USG Corp. L&M Mfg., Inc. Laticrete International, Inc.

09 30 13 Ceramic Tiling

Colors, Textures and Patterns

Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.
2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
3. Colors shall be in accordance with Northwest interior color standards. See Appendix B. Coordinate with Northwest Project Manager.

Factory Balancing

For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages, and so that they match approved samples. If tile is not factory blended, either return to manufacturer or blend tiles at project site before installing.

Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

Floor Tile

Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout types.

1. Portland Cement Mortar
2. Bond Coat: thin-set mortar on cured bed, at Contractor's option: portland cement mortar, either latex or dry-set
3. Concrete Subfloors, Interior: TCA F112 (bonded)
4. Grout: Latex-portland cement

Installation, general

Comply with TCA "Handbook for Ceramic Tile Installation." Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

1. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight-aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
2. Lay out tile wainscots to the next full tile beyond dimensions indicated.
3. Grout tile (ceramic) to comply with installation standards.
4. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are of same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so that the extent of each sheet is not apparent in the finished work.
5. Clean all joints and corners to provide a finished appearance. Any excess or splattered mortar on tile surfaces must be removed before tile becomes discolored. Contractor must achieve a smooth finish on all surfaces and in all corners.

Cleaning

Remove spilled, splashed, or splattered mortar from all surfaces; do so as work proceeds and upon completion. Do not mar surface finish of item being cleaned. Clean up of brushes, rollers and other materials should be done only in custodial or mechanical slop sinks.

Upon completion of work, leave premises in as good or better condition than when work was started.

Standards

Installation Materials: Comply with ANSI standard, referenced with products and materials indicated for setting and grouting.

Tile: Comply with “American National Standard Specifications for Ceramic Tile,” for all types, compositions, and grades of tile indicated. Furnish tile complying with “Standard Grade” requirements, unless otherwise indicated.

Wall Tile

Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCA installation methods related to sub-surface wall conditions, and grout types:

1. Organic Adhesive, as specified by manufacturer
2. Gypsum Board, Interior: TCA W242
3. Grout: Latex-portland cement

Accessories

Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

1. Size: Coordinate with sizes and coursing of adjoining flat tile.
2. Shapes: Shall be as specified in the following, selected from manufacturer’s standard shapes: base for wall tile; wainscot cap for thinset mortar installations, surface bullnose; external corners for thinset installations, surface bullnose; internal corners, field-butted square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

Setting Materials

Portland Cement Mortar Installation Materials: Latex additive (water emulsion) shall serve as replacement for part or all of gauging water and shall be of type specifically recommended by additive manufacturer (manufacturer’s standard) for use with job-mixed Portland cement and aggregate mortarboard.

Grouting Materials

General: Type shall be latex sealant grout. Color shall be dark (brown, black, charcoal, etc.)

Cement Grout, Latex-portland: Color as selected from manufacturer's standard. Composition shall be latex additive (water emulsion) serving as replacement for part or all of gauging water, added at job site with dry grout mixture.

1. Latex Type: Manufacturer's standard
2. Dry Grout Mixture: Dry-set grout specified or supplied by latex additive manufacturer. Use latex additive without retarder with dry-set grout.
3. Application: Use dry-set grout combined with latex additive for grouting joints in glazed wall tile. Use grout recommended by tile manufacturer in wet locations. Use sealer recommended by tile manufacturer. Select color, "black," from manufacturer's standard.

Mortar and Grout, Mixing: Mix to comply with requirements of referenced standards and manufacturers, including those for accurate proportioning of materials, water, or additive content. Type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application needed.

- END OF SECTION

09 50 00 - Ceilings

09 50 10 General Information

All acoustical ceiling tile systems shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.

Interlocking ceiling tile shall not be used as part of the construction process.

Mirrored-panel ceilings shall not be used as part of the construction process unless otherwise approved by Northwest Design and Construction.

Ceiling Suspension Grid

Such shall be designed so as not to require any ceiling tile with its smallest dimension less than 10-in. Any deviations from this standard shall be permitted only as approved by Northwest Facility Services.

- END OF SECTION –

09 60 00 - Flooring

09 60 10 General Information

- All flooring shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.
- No flooring requiring finish shall be installed adjacent to carpeted areas.
- Brick flooring shall not be used in any application.
- The following types of flooring shall be used only as approved by Northwest Facility Services: specialty flooring; flagstone, granite, marble, slate, and stone flooring; wood flooring; rubber and sheet flooring; fluid-applied flooring.
- All resilient bases, resilient stair treads and risers, nosings, resilient edging and transitions for carpet shall be used only as approved by Northwest Facility Services.
    - Rubber stair treads and landings shall have low profile raised circular pattern, or Northwest Facility Services approved equal. Recessed profiles are not allowed.
- VCT and sheet vinyl, if approved by Northwest Facility Services, shall be installed with factory finish.
- Luxury Vinyl Tile/Plank flooring shall be coordinated with Northwest Facility Services for appropriate floor finish, if recommended by manufacturer.
- Floor finishes such as chemically stained concrete must be approved by Northwest Facility Services.
        - *See "Concrete Finishing" in section 033500.*

09 66 00 Terrazzo Flooring

Plastic matrix terrazzo shall not be used in any construction process.

09 68 00 CARPETING

Carpet shall be in compliance with Northwest interior standards. See Appendix B. Carpet shall have no cushion or pad unless otherwise approved by Northwest Facility Services.

The use of solid color carpet (border or infill) should be minimized and used only when approved by Northwest Facility Services. Carpet border and infill must be the same quality as the surrounding carpet.

Cleaning

Remove spilled, splashed, or splattered adhesive from all surfaces; do so as work proceeds and upon completion. Do not mar surface finish of item being cleaned. Clean up of brushes, rollers and other materials should be done only in custodial or mechanical slop sinks.

Upon completion of work, leave premises in as good or better condition than when work was started.

- END OF SECTION –

09 70 00 - Wall Finishes

09 70 10 General Information

- Any wall finish installed must be easily maintainable or replaceable and resistant to vandalism. Any exceptions to the aforementioned shall be approved by Northwest Facility Services.

- In areas where chairs, carts or other portable items may frequently come in contact with the walls a commercial chair rail shall be used to protect these surfaces.

- *Also see section 102600 – Wall and Door Protection.*

09 73 00 Wall Carpeting

No carpeting shall be used on walls or ceilings unless otherwise approved by Northwest Facility Services.

- END OF SECTION –

09 80 00 - Acoustic Treatment

09 84 13 FIXED SOUND-ABSORPTIVE PANELS

Acoustical/Tackable Panels

Panels shall be of make by Golterman & Sabo or Facility Services approved equal, Acousti-Tack (ATF), 1 1/8-in. thickness.

- END OF SECTION –

09 90 00 - Painting and Coating

09 90 10 General Information

- All paint colors shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.
- Environmental Conditions: Do not apply finishes in areas where dust is being generated. Provide a minimum of 50 foot-candles of lighting on surfaces to be finished. Comply with manufacturer's recommendations as to environmental conditions under which finishes can be applied.
- Protection: Adequately protect other surfaces from receiving any damage during application of paints and coatings. Repair damage as a result of inadequate protection. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces that are not receiving finish.

09 91 00 Painting

Application

Preparation: Prepare and clean each substrate condition in accordance with manufacturer's instructions and as herein specified. Provide barrier coats or remove and re-prime incompatible primers as required. Clean surfaces before applying surface treatment.

1. Remove surface contamination and oils, and wash with solvent. Remove oil and grease prior to mechanical cleaning.
2. Coordinate cleaning and painting to ensure that no cleaning contaminants fall onto newly coated areas.
3. Apply a coat of etching primer.

Apply paint with suitable brushes. Spray application of final coat is not permissible unless otherwise approved by Northwest Design and Construction. Rate of application shall not exceed that as recommended by paint manufacturer for the surface and type of paint involved. Keep brushes clean, dry, free from contaminants, and suitable for the finish required. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping. Runs on face shall not be permitted.

1. Comply with recommendation of product manufacturer for drying time between succeeding coats.
2. Sand and dust between each coat to remove defects visible from a distance of 5 feet.
3. All necessary repairs done before priming or painting.

4. Finish coats shall be smooth, free of brush marks, streaks, laps, or pile-up of paints, and skipped or missed areas.

Cleaning

Touch up and restore finish where damaged. Remove spilled, splashed, or splattered paint from all surfaces; do so as work proceeds and upon completion. Do not mar surface finish of item being cleaned. Clean up of brushes, rollers and other materials should be done only in custodial or mechanical slop sinks.

Upon completion of work, leave premises in as good or better condition than when work was started.

Inspection

Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work – and also those that cannot be put into acceptable condition through preparatory work specified herein.

Report, in writing, any condition that may affect the proper application of work specified within this section. Do not proceed with surface preparation or coating application until conditions are suitable.

Manufacturers

Paint product made by one of the following manufacturers will be considered, in accordance with standard substitution procedures:

1. Sherwin Williams Company
    a. Use products of a single manufacturer for painting each type of surface. Northwest standards follow. Any deviations shall be approved by Northwest Facility Services in advance.
2. General Surfaces
    a. Promar 200
3. Metal Surfaces shall be one of the following based on project conditions:

    a. Pro Classic – Interior Water-based Acrylic- Alkyd
    b. Pro Mar 200 – Interior Alkyd
    c. Acrylic DTM

Mixing and Tinting

Deliver paints and enamels ready-mixed to job site. Job tinting will not be allowed.

Moisture Content of Surface

Do not apply initial coating until moisture content of surface is within limitation recommended by paint manufacturer. Test with moisture meter.

Schedule, painting / finishing

General *Apply the specified number of coats minimum and as required to completely cover. Use Sherwin Williams paints for basis of quality as below listed.*
Galvanized metals One coat of rust-inhibitive primer, galvanized compatible Two coats of rust-inhibitive paint
New door frame and metal doors One coat of rust-inhibitive primer Two coats of rust-inhibitive paint (semi-gloss)
Paint for CMU walls One coat of latex block primer/filler Two coats of latex paint (semi-gloss)
Ferrous metals One coat of rust-inhibitive primer Two coats of rust-inhibitive paint
Paint for plywood supports and related items One coat of wood primer Two coats of latex paint (semi-gloss)
Paint for gypsum board One coat of primer Two coats of latex paint (semi-gloss)
Stain for exterior wood Two coats superdeck exterior waterborne semi-transparent stain Color: SW 3511 Cedar Bark

Successive Coats

Comply with recommendation of product manufacturer for drying time between succeeding coats. Sand and dust between each coat to remove defects visible from a distance of five feet.

Finish coats shall be smooth, free of brush marks, streaks, laps, or pile-up of paints, and skipped or missed areas.

- END OF SECTION –

Division 10 - Specialties

10 11 00 - Visual Display Units

10 11 10 General Information

- Chalkboards: Chalkboards shall not be allowed.
- Markerboards: Such shall be of porcelain-enameled steel. Markerboards shall be designed with a magnetic surface.
    - Basis of design shall be Learniture Porcelain Steel Magnetic Dry Erase Board w/ Aluminum Frame & Map Rail, sized to fit the application, or Facility Services approved equal.
- Cork Usage: Bulletin boards with mounting surfaces of cork shall not be allowed.
- Tackboards: Shall be cloth covered, high-density foam such as Golterman-Sabo or Claridge brands.

- END OF SECTION –

10 14 00 - Signage

10 14 00 SIGNAGE

General

Contractors and design professionals shall include building directories for all buildings and floors affected by renovation.

Fonts

When displaying the words, "Northwest Missouri State University," contact the Northwest Marketing and Communications Office, ext. 1425, for the Northwest standard.

Exterior Signage

Contact Northwest Facility Services for exterior signage specifications. All exterior signage shall be in compliance with Northwest Campus Master Plan guidelines.

Accessibility Signage

All accessibility signage not supplied by Northwest shall meet the 100 percent contrast standard set by Northwest and shall conform to Northwest design standards and all applicable governing regulations. See example on following page.

ADA Signage Standard Example

- END OF SECTION –

10 21 00 - Compartments and Cubicles

10 21 10 General Information

Restroom Stalls: Stalls shall be placed widely enough (36” minimum clear width) to allow for placement of large toilet tissue dispensers Scott Essential Jumbo Roll Toilet Paper Dispenser model #09507, black color. *See section 102813 Toilet Accessories.*

Toilet Compartments: Only solid plastic toilet partitions and privacy screens shall be allowed. Such shall have uniform color throughout.

Shower and Dressing Compartments: Only solid plastic shower and dressing compartments shall be allowed. Such shall have uniform color throughout.

Urinal Screens: Urinal screens shall be 24” deep and same height as toilet compartment panels.

All toilet and urinal screen partitions shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.

- END OF SECTION-

10 22 00 - Partitions

10 22 10 General Information

Accordion-style doors/partitions shall not be used.

- END OF SECTION -

10 26 00 - Wall and Door Protection

10 26 00 General Information

Corner Guards

Outside corners shall be protected with corner guards, either vinyl or stainless steel. The appropriate corner guards shall be installed only as approved by Northwest Facility Services. Corner guards shall be https://wallguard.com/corner-guards/ in color Gray, or as approved by Northwest Facility Services.

Wall Guards

Wall guards shall be provided where susceptibility exists for damage from heavy use and or maintenance/cleaning equipment. The appropriate guards shall be installed only as approved by Northwest Facility Services. Corner guards shall be https://wallguard.com/wallguards/ in color Gray, or as approved by Northwest Facility Services.

- END OF SECTION –

10 28 00 - Toilet, Bath, and Laundry Accessories

10 28 13 TOILET ACCESSORIES

Mirror Units

Toilet room mirror units shall be stainless steel frame type standard mirrors by ASI Group, Bobrick Washroom Equipment, or Bradley Corporation. Provide rigid, tamper and theft resistant installation with galvanized steel wall bracket and concealed locking devices requiring a special tool to remove.

Diaper Changing Station

Diaper changing stations shall be included when renovating any campus building. Such shall be Koala Bear Kare brand, horizontal model KB300 or vertical model KB301. Substitutions shall be only with approval of Northwest Facility Services.

Paper Towel Dispensers

Northwest will provide – contractor to install.
Paper towel dispensers shall be Kimberly Clark, Sanitouch Manual Hard Roll Towel Dispenser, Black, 09990. Unit is to be mounted within a recessed compartment in order to meet Accessibility standards.

At least one dispenser per restroom shall be placed in accordance with ADA accessibility requirements.

Sanitary Napkin Receptacle (Disposal)

Northwest will provide – contractor to install.
Hospeco 250-201W Sanitary Napkin Receptacle, Plastic, White

Sanitary Napkin Vendor

Northwest will provide – contractor to install.
Rochester Midland, #J6, double vendor. Northwest will remove payment system from the vendors prior to installation. Coordinate with Project Manager.

Soap Dispensers

Northwest will provide – contractor to install.
Only wall-mounted units shall be used. Such shall be Dial FIT X1 dispenser, slate color. Installation shall be so units can be conveniently refilled and so soap does not drip on wall or floor. At least one (or per ADA quantity requirements) soap dispenser per restroom shall meet Accessibility compliance.

Northwest branding logo shall be affixed to the units prior to installation. Coordinate with Project Manager.

Toilet Tissue Dispensers

Northwest will provide – contractor to install.
Such shall be Kimberly-Clark Toilet Paper Dispenser model #09507, black color.

Waste Disposal Units, general

Northwest will provide and install.
Waste disposal units for paper towels shall be open-top movable containers, approved by Northwest Facility Services.

Hand Dryers

Contractor to provide and install. Hand dryers shall be Dyson Airblade V, HU02 Sprayed Nickel, 110-120v (LV) – 307174-01 . Substitutions shall be only with approval of Northwest Facility Services.

Hand Sanitizer Dispensers

Northwest will provide – contractor to install.
Hand sanitizer dispensers shall be 5024-01 Purell ES-4 push style, graphite, wall mounted, hand sanitizer dispenser with drip tray. Substitutions shall be only with approval of Northwest Facility Services.

Northwest branding logo shall be affixed to the units prior to installation. Coordinate with Project Manager.

10 28 16 BATH ACCESSORIES

Tub and Shower Enclosures

The following tub and shower units have been approved by Northwest Facility Services. Any deviation shall be approved in advance by Northwest Facility Services. Designer shall review accessibility requirements and adapt the approved units/models accordingly.

Shower Unit: Best Bath Systems, *model LSSS4836CP*

- Molded, one-piece gelcoat/fiberglass shower module
- "Smooth" wall finish, white in color
- Integral full wood backing for strength and unlimited accessory placement

ADA Compliant Shower Unit: Best Bath Systems, *model LSS4038A5T*

- Molded, one-piece gelcoat/fiberglass shower module
- "Smooth" wall finish, white in color
- Integral full wood backing for strength and unlimited accessory placement
- ADA compliant transfer shower; available in various threshold heights

Tub/Shower Unit: Best Bath Systems, *model LSTS6030CP*

- Molded, one-piece gelcoat/fiberglass shower module
- "Smooth" wall finish, white in color
- Integral full wood backing for strength and unlimited accessory placement

- END OF SECTION –

10 43 00 - Emergency Aid Specialties

10 43 10 GENERAL INFORMATION

AEDs shall be Lifepak CR2 unless otherwise approved by Northwest Facility Services.

The AED shall be mounted in a wall cabinet with alarm that fits the design of the building. It is to be installed in an unobstructed area no more than 48” above the finished floor.

- END OF SECTION -

10 44 00 - Fire Protection Specialties

10 44 10 GENERAL INFORMATION

All fire protection devices and related appurtenances shall meet appropriate NFPA codes.

Designer shall confirm with Northwest Facility Services to determine whether fire extinguishers will be provided by Northwest or by Contractor. All fire extinguisher cabinets shall be provided and installed by Contractor.

- END OF SECTION -

10 50 00 – Storage Specialties

10 51 10 LOCKERS

Combination Locks with key-switchable combinations shall be used unless otherwise approved by Northwest Facility Services.

10 55 00 POSTAL SPECIALTIES

Mailboxes

Schlage 5-pin cylinders shall be used on any lockable mailbox. A Northwest Facility Services locksmith shall be consulted before any locks are selected.

10 56 00 STORAGE ASSEMBLIES

Restroom Shelving

Shelves shall be installed in restrooms at a location close to where people wash their hands. The shelving shall be large and durable enough for book bags to be placed on it.

10 57 00 WARDROBE AND CLOSET SPECIALTIES

- Horizontal bars inside closets shall be of chrome-plated steel. Wooden bars shall not be used.
- Coat hooks shall be wall mounted nail head type satin aluminum. Acceptable product shall be Safeco model 4201 or 4200 as approved by Northwest Facility Services.

- END OF SECTION –

10 75 00 - Flagpoles

10 75 10 General Information

- Exterior flagpoles shall be of brushed aluminum finish with an internal halyard and a 5-inch ball.
- Any new flagpole installation must be approved by Northwest Facility Services.
- Any proposed flag display including the American flag must include lighting for 24-hour display.

- END OF SECTION –

Division 11 - Equipment

11 40 00 - Food Service Equipment

11 46 83 ICE MACHINES

Ice machines shall be of make by Manitowoc, air-cooled, cuber style, or Northwest Facility Services approved equal. Only ice machines in non-public areas may be bin style; any ice machines in public areas shall be dispenser style. Model shall be determined by capacity need of user. Placement shall be so as to provide adequate ventilation.

Supply water line must have a back flow preventer.

A floor drain and appropriate electrical service shall be installed to serve the ice machine.

- END OF SECTION –

11 52 00 - Audio-Visual Equipment

11 52 10 GENERAL INFORMATION

Classrooms

Classroom designs shall allow for teacher stations to be located within the front 10-ft. (approximately) of classrooms. Stations shall also be positioned to what would be the students' left side of the classroom.

Lighting near the projection surface should be switched separately from the general room lighting to eliminate washout of projected images.

A 1.5" conduit shall be provided to a standard wall box in the area of the teacher station to connect with room AV systems. Conduit termination point will be above finished ceiling easily accessible to projector mounting location.

Power for the teacher station should also be provided by a duplex outlet within 16" from the AV wall box.

For ceiling mounted projectors:

- Ceiling box with an integrated projector mount for 1 ½" standard NFS fitting, space for AV equipment and electrical connections for equipment shall be provided and installed. Legrand Wiremold Evolution series ECB2SP with ECB-SPD option and ECB-Shelf options or similar approved by Northwest Information Technology.
- Ceiling box installation location 14' back from projection surface centered on screen.
- Projector brand will be Epson, furnished and installed by owner.

Wall mounted projectors:

- Double duplex outlet (4 plugs) located above projector mounting location. Bottom of outlet box minimum 24" above top edge of projection surface. Exact location of wall mount projector will be determined by location and size of projection whiteboard. Generally projector will attach 12" above projection surface to bottom of projector mounting plate.
- For wall mounted projectors a 2'x3' solid wood blocking shall be provided. Wall should be constructed to minimize vibrations from floors, ceiling and mechanical systems being transferred to projector.
- Projector brand will be Epson furnished and install by owner.

Projector mounting shall be only as approved by Northwest Design and Construction and Northwest Computing Services.

Projection screens (motorized, manual or projection whiteboard) shall be mounted only as approved by Northwest Design and Construction and Northwest Information Technology. Projection surface size must be a minimum of 100 inches diagonal in 16:10 format.

Minimum surface size is 8’ x 8’ for manual, pulldown or electric screens. Projection whiteboard 54.6” x 1.0” x 86.6”.

In classrooms where audio and/or light control is deemed necessary, controls shall be wall mounted near the teacher station location.

Classrooms spaces 50 and above should be considered as needing an audio system which shall include but not limited to:

- 2 microphone inputs with 2 wireless microphones and receivers
- 1 audio input from teacher station equipment Line output.
- 1 mixer
- 1 ventilated lockable cabinet for audio equipment with master sequenced power switch
- 1 control box with presets for all inputs and outputs

Conference/Meeting rooms

Lighting near the projection surface or display should be switched separately from the general room lighting to eliminate washout of projected images.

A 1.5” conduit shall be provided to a wall location to connect with room AV systems. Conduit termination point will be above finished ceiling easily accessible to projector or display mounting location. Exact wall location and termination of conduit will be determined by room design and layout. Wall termination in general needs to be a low voltage frame capable of holding 3 Gang 5.54” x 2.83”(4.331” with tabs) x 1.404” Note: Wall box portion depth 1.04” Space in wall cavity to allow for cat6 shielded cable to connect on side or back AV device.

Rooms using wall or ceiling projectors for displays will be the same requirements as for classrooms

LED display panel:

- FSR PWB-200 wall box installed behind screen location. 1.5” conduit from above finished ceiling to wall box. Minimum of 1 duplex power receptacle installed inside wall box.
- 3’x4’ solid wood blocking shall be provided in the wall. Blocking centered on FSR-PWB-200 wall box.
- Display will be furnished and install by Owner

- END OF SECTION –

11 82 00 - Facility Solid Waste Handling Equipment

11 82 10 General Information

Recycling Containers, interior

Interior building spaces shall provide for the installation of recycling containers by Rubbermaid Commercial Products, Slim Jim Recycling Station #2007913 with colored lids for 4 streams (Landfill, Paper, Cans, and Plastic), 23-gal, with hanging lid inserts.

Placement: At minimum, one 4-stream recycling container, per building, per floor (in all buildings) shall be placed, along with additional blue color 50-gallon rollout recycling containers (basis of design: https://www.rubbermaidcommercial.com/utility-refuse/rollout-containers/recycle-rollout-with-lid-50-gal-blue/) placed on floors where faculty/staff offices are located, and as required by Northwest Facility Services.

Recycling Containers, exterior

Exterior recycling containers shall be provided by Northwest. Designers shall allow for a location that provides ease of access for the user and removal by Northwest Facility Services.

- END OF SECTION –

Division 12 - Furnishings

12 05 13 - Fabrics

12 05 13 FABRICS

- All fabrics shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.

- Fabrics used for upholstery, rugs, mats, chairs, and other furnishings and accessories shall be reviewed with and approved by Northwest Facility Services for cleanability prior to specification and use.

- Comply with all code requirements for flame-spread and smoke-developed indices and classifications.

- END OF SECTION –

12 10 00 - Art

12 10 10 GENERAL INFORMATION

- Northwest students who are currently enrolled in the Large Sculpture class may request a temporarily display of sculpture pieces on campus grounds. The student(s) must request permission from the Facility Services Department. Facility Services leadership will review/recommend site locations, method and possible modification for safe installation, determine if utility locates are warranted in advance, and approve the period of time the sculpture will be on display.
- The student(s) is responsible for installation and removal of the sculpture in the approved location and via the methods approved by Facility Services. Signs identifying the sculptor or the sculpture may not be installed.
- Facility Services will remove the sculpture if deemed unsafe, unsightly due to maintenance deficiencies, and/or past the agreed upon timeframe for display. Sculptures left on the campus grounds past the agreed upon timeline will be removed by Facility Services and considered abandoned property.

- END OF SECTION –

12 24 00 – Window Shades

Roller Window Shades

Roller window shades shall be Hunter Douglas with aluminum fascia and 1% openness fabric or Northwest approved equal. Provide all current safety accessories, mountings and mechanisms. See Northwest current color standards in Appendix B.

Horizontal Blinds

Horizontal blinds shall be SWF Contract, or Northwest approved equal. Provide all current safety accessories, mountings and mechanisms. See Northwest current color standards in Appendix B.

12 48 43 – Floor Mats

Chair Mats

Provide heavy duty clear office chair mat for carpeted surfaces of approximately 36”x48” size with smooth rounded corners, ramped edges. Provide mats with gripping surface underneath for carpeted floor areas. Coordinate exact product with Northwest Facility Services.

12 50 00 - Furniture

12 51 00 OFFICE FURNITURE

- KI furniture, or Northwest Facility Services approved equal, shall be used in offices. Style of furniture shall be determined by Northwest Standards and as approved by Northwest Facility Services.

    1. Office Furniture

        a. Desking System: Orenda Casegoods

        b. Task Chair: Impress Ultra Task, Ped Base, Mesh Mid-Back, Adjustable Arms, Upholstered Seat

        c. Side Chair: Strive Four-Leg Armless Chair, Upholstered Seat

12 56 33 CLASSROOM FURNITURE

- KI furniture, or Northwest Facility Services approved equal, shall be used in classrooms. Style of furniture shall be determined by Northwest Standards and as approved by Northwest Facility Services.

1. Classroom Furniture

    a. Tables

        i. Pirouette, Fixed or Nesting Training is standard. Computer Lab standard is In-Tandem Work Surface (24"x48"). ADA Table standard is Workup Rectangular Table, Crank Base (23 ½"x64 ½")
        ii. Shape: Rectangular is standard. Other options are Chevron.
        iii. Edge Type: 54B Edge
        iv. Edge Color: Flannel Edge
        v. Size: 24"x60", 30"x60" are standard. Other exceptions are 30" and 36" table widths.
        vi. Laminate: KI Laminates Misted Zephyr 4843-60
        vii. Leg Finish: Black
        viii. Casters/Glides: Black Wheel, Silver Hub 2 locking/2 non-locking.

    b. Student Chairs

        i. Strive, Fixed or Nesting, Armless Chair, Upholstered Seat is standard. Strive Task is the standard in Computer Labs.

            1. Frame or Base Color: Black
            2. Upholstery Grade/Color: Compliance to TB 117-2013
            3. Upholstery Grade/Color: Fabric Grade 1
            4. G1 Fabric: 1K Skyline
            5. 1K Skyline: Iron
            6. Poly Seat & Back Color: Flannel No Fire Retardant
            7. Base Option: Carpet Casters (Black Only)

    c. Instructor Chairs

        i. Strive Task Armless Stool, Upholstered Seat

            1. Frame or Base Color: Black
            2. Upholstery Grade/Color: Compliance to TB 117-2013
            3. Upholstery Grade/Color: Fabric Grade 1
            4. G1 Fabric: 1K Skyline
            5. 1K Skyline: Iron
            6. Poly Seat & Back Color: Flannel No Fire Retardant
            7. Base Option: Carpet Casters (Black Only)

12 59 00 SYSTEMS FURNITURE

- KI modular systems furniture shall be used in offices and classrooms. Style of furniture shall be determined by Northwest Standards and as approved by Northwest Facility Services.

- END OF SECTION –

12 60 00 - Multiple Seating

12 61 00 Fixed Audience Seating

All seating fabrics shall comply with Northwest interior standards. Northwest interior standards are subcategorized into three building types, including Academics/Administration, Athletics and Residential Life. See Appendix B.

Permanent theater, auditorium, or lecture hall seating shall be floor mounted. Any exception requiring mounting on a vertical surface shall be permitted only as approved by Northwest Facility Services.

- END OF SECTION –

12 92 00 - Interior Planters and Artificial Plants

12 92 10 GENERAL INFORMATION

- Placement and design of interior plants and planters shall be coordinated with Northwest Facility Services.

- END OF SECTION –

12 93 00 - Interior Public Space Furnishings

12 93 13 BICYCLE RACKS

Bicycle Racks

Bicycle racks shall be Graber Manufacturing Post and Ring Bike Rack, 2-Bike capacity, surface mount, black powder coated, **PAR-2-SF-P**. Substitutions shall be only with approval of Northwest Facility Services.

12 93 23 TRASH AND LITTER RECEPTACLES

Trash Receptacles

Exterior trash receptacles shall be Global Industrial Outdoor Slatted Steel Trash Can, 36-gallon, black, model #260804BH. Includes Rain Bonnet Lid, black plastic liner, and anchor kit.

12 93 43 SITE SEATING AND TABLES

Benches

Exterior benches shall be Dumor, Inc. 160 Series, 6-ft., black, polyester powder coated, galvanized steel seat and cast-iron bench supports. Memorial benches shall be supplied with optional insert for 2”x10”x1/4” zinc etched plaque at seat back.

- END OF SECTION –

Division 14 - Conveying Systems

14 20 00 - Elevators

14 20 10 General Information

- The minimum standard for elevator shafts shall be CMU. Poured concrete shaft would be preferred when budget allows. The use of wood or steel framing is not allowed.
- In buildings four stories tall or less, new installations shall be hydraulic elevator with PVC sleeve.
- All elevators shall incorporate soft starters. Mechanical starters shall not be used.
- Existing elevators in buildings to be renovated shall be modernized without changing the type of conveyance.
- The amount of change to an existing system shall be determined by Northwest Facility Services, the design professional, and the selected elevator consultant (i.e. lift and control cables, cylinders, inside and outside control panels, doors, etc.).
- When replacing or eliminating hydraulic cylinders, the disposal of all related fluids shall comply with all local, state, and federal guidelines. When removing in-ground cylinders, the remaining cavity shall be properly backfilled with concrete or other material as approved by Northwest Facility Services.
- All installations shall meet or exceed ADA requirements and comply with state elevator code.
- Elevator demolition, renovation, and installation shall be handled by the same contractor.
- Unless otherwise specified, Vertitron Controllers shall be used. Controller must be compliable with all levels of PET tools programming devices.
- When traction elevators are approved variable frequency drives shall be used.
- Door operators shall be approved by Northwest Facility Services. GAL door operators, closed loop preferred.

- END OF SECTION –

Division 21 - Fire Suppression

21 00 00 - Fire Suppression

21 00 00 General Requirements

- Sprinklers: Fire suppression sprinklers shall be wet pipe when such option exists.
- Pipe Sleeves: Such shall be used for all piping passing through concrete construction.

21 11 16 Facility Fire Hydrants

Fire hydrants should be located as to meet all applicable codes. Make shall be Mueller A423 5-1/4" with a 4-1/2 foot bury.

21 31 00 Fire Pumps

Fire pumps shall be of the horizontal configuration. Vertical pumps shall not be used without written approval from Northwest Facility Services.

- END OF SECTION –

Division 22 - Plumbing

22 05 00 - Common Work Results for Plumbing

22 05 10 General Information

- Unless otherwise specified, Contractor shall perform all mechanical work required for the proper installation and operation of equipment, furnishings, devices, and systems specified in other divisions.
- Contractor shall Receive, uncrate, mount, connect, and adjust mechanical equipment furnished under all divisions of the specifications.
- Unless otherwise specified, Contractor shall furnish and install all piping, shut-off valves, traps, ducts, and all other elements of mechanical work required for both rough-in and final connection of equipment, furnishings, devices, and systems as specified, indicated, or as recommended by the manufacturer or supplier.
- Contractor shall clean all ductwork coils and air handling units prior to startup and turning equipment over to the owner.
- Manufactured Curbs – height of such shall be a minimum of 10-inches.
- Contractor shall flush all newly installed piping prior to final tie-in unless otherwise approved by Northwest Facility Services.
- Pipe routing in existing buildings shall be approved by Northwest Facility Services.
- Contractor shall install piping such that excessive expansion forces are not present in the hot or cold position.
- Contractor shall perform all necessary cutting, drilling, and patching of structures required for installation of piping. Contractor shall obtain the consent of Northwest Facility Services prior to modification of any structure.

22 05 48 Vibration and Seismic Controls for Plumbing Piping and Equipment

Anchor Bolts

Furnish and install galvanized anchor bolts for all equipment placed on concrete equipment pads or on concrete slabs. Bolts shall be the size and number recommended by the manufacturer of the equipment and shall be located by means of suitable templates.

Pads, Equipment

Concrete pads shall be provided for all floor mounted mechanical equipment. An equipment pad shall generally conform to the shape of the piece of equipment it serves with a minimum 3-in. margin around the equipment and supports. Pads shall be a minimum of 4-in. high and made of a minimum 28-day, 2500-psi concrete, reinforced with 6-in.-by-6-in. 6/6 gauge welded wire mesh. Tops and sides of pad shall be troweled to smooth finishes, equal to those of the floors, with all external corners bullnosed to a ¾-in. radius.

Vibration Isolation

General: Vibration isolation devices, including steel bases and concrete inertia bases shall be furnished and installed as specified below or as specified with the particular item of equipment.

1. Products: Isolation equipment shall be as manufactured by Amber/Booth (AB) or equivalent products of Consolidated Kinetics, Mason, Korfund or Vibration Eliminator Co.
2. All steel components shall be prime coated. All rails, saddles, frames and bases shall be supplied with mounting turnplates. Fan bases shall be equipped with motor slide rails. Pump bases shall be sized to support the end suction or split case suction and discharge elbows. All spring isolators shall be capable of 30 percent over-travel before becoming solid, and furnished with neoprene friction pad on the baseplate. All open spring isolators shall be designed for a minimum width to height ratio of 0.8.

Isolator Types: Equipment isolator types shall conform to the following, except that 2.5-in. deflection for units above grade may be reduced if a 95 percent minimum efficiency is provided:

1. Concrete Inertia Base: AB Co. CIB Frame, with minimum 6-in. structural channels and welded in place reinforcing bars. Spring isolators shall be unhoused with leveling bolts. Spring deflection shall be 2.5-in. minimum for bases above grade and 1.5-in. minimum for based on grade.
2. Spring Hanger: AB Co. BSR combination rubber-in-shear and spring unit selected for minimum 1-in. deflection.
3. Floor Mounted Rubber-in-Shear Units: AB Co. RV, double deflection.

Joints: Furnish and install Teflon isolation joints on inlet and discharge from each base-mounted pump, except fire pumps.

1. Joints on piping 6-in. and smaller shall be Fluoroflex-T No. R6904 spool type joint as manufactured by Resistoflex Corporation, or approved equal, flanged type. Provide control unit on each joint with neoprene isolation washers to limit expansion.
2. Joints on piping 8-in. and larger shall be Hyspan Series 5500, or equal Flexonics Model TCS, laminated multi-ply stainless steel bellows type with tie rods.
3. All joints shall be designed for 125 psi water pressure and be suitable for 40 degrees F to 210 degrees F operating range. Set control units to exact face-to-face dimension before applying water pressure.

Pads, Neoprene Isolation: Neoprene isolation pads shall be equal to Amber/Booth NRC two-layer ribbed neoprene pad bonded to a cork separator.

Spring Hangers: Shall be equal to AB Co. BSR combination rubber-in-shear and spring unit selected for minimum 1-in. deflection.

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

Painting and Identification

Touch-up or refinish minor damage to items of equipment supplied with manufacturer's standard finish.

Labeling Methods: Exposed pipes shall be identified by applying approved abbreviations or names with 1-in.-high stencils and an arrow indicating direction of flow at each end of each wall, at equipment, and at 15-ft. intervals. Brady Type B-350, or equal Seton self-sticking legends and flow arrows may be used in lieu of stencils. Secure using pipe banding tape at each end of the legend or flow arrow. Banding tape shall pass completely around the pipe at least once. All capped connections for future extensions, if any, shall have identification at cap indicating service.

Furnish with each valve (except an isolation valve on an individual unit of equipment) an unpainted brass tag, 1/32-in.-thick, 1¼-in. diameter, fastened to valve body with beaded chain. Marking shall have prefix "H" for heating or air conditioning or "P" for plumbing, a number keyed to a list posted in the room; and "NO" for "Normally Open" or "NC" for Normally Closed".

- END OF SECTION –

22 07 00 - Plumbing Insulation

22 07 10 INSULATION GENERAL INFORMATION

Materials and Methods, general

General: Insulate all systems including valves, fittings, unions and flanges as specified. All valves, flanges and fittings shall be insulated with rigid fiberglass or calcium silicate premolded fittings with jacket to match adjacent insulation. Zeston or equal PVC premolded covers that have a maximum flame spread rating of 25 and a maximum smoke developed rating of 50 are also acceptable. Covers in cold piping shall be installed to achieve an effective vapor barrier.

Compliance Requirements: All insulation shall be installed in accordance with the "Commercial & Industrial Insulation Standards," published by the Midwest Insulation Contractors Association.

Covers for Equipment Service: Equipment insulation shall include removable covers for those items of equipment requiring service. This includes, but is not limited to, strainers and heat exchanger heads.

Fiberglass Insulation: Fiberglass insulation shall be made in premolded sections and shall have an average thermal conductivity not to exceed 0.24 BTU-in./square ft. -F^{o} - hour at a mean temperature of 75 degrees F. Insulation shall be as manufactured by Manville, PPG, Certain-Teed/St. Gobain, Knauf, Armstrong or Owens Corning. Joints shall be butted firmly together. Longitudinal jacket laps and butt strips shall be smoothly secured with Benjamin Foster 82-07 adhesive, or equal. Outward clinch staples shall be used on laps as required for insulation over heating lines only.

Inserts: Inserts and thermal hanger shields shall be installed at all hangers and supports that are external to the insulation. Inserts shall be foam glass, asbestos-free calcium silicate or rigid foamed plastic. Pipe insert thickness shall be equal to the adjoining insulation. The length of inserts for each pipe size shall not be less than the following:

Size of Pipe	***Length of Insert***
½-in. to 2½-in.	6-in.
3-in. to 6-in.	9-in.
8-in. to 10-in.	12-in.
12-in. and larger	18-in.

1. Wood dowel inserts shall not be used in lieu of rigid insulation inserts.
2. Where the specified insulation thickness is ½-in., the rigid inserts at hangers and supports may be omitted.

22 07 19 PLUMBING PIPING INSULATION

Pipe Freeze Protection System

No piping shall be placed in unheated areas where freezing might occur.

Pipe Insulation, installation of

General: Insulation shall be applied on clean dry surfaces. Insulation on all cold surfaces where vapor barrier jackets are used shall be applied with a continuous, unbroken vapor seal.

1. Riser clamps, anchors, etc., that are secured directly to cold surfaces shall be adequately insulated and vapor-sealed to prevent condensation.
2. Staples shall be allowed in vapor barriers on cold piping, provided that outward clinching staples be used and that each staple be coated with Fosters 30-36 or equal as approved by Northwest Design and Construction.

Expansion of Pipes: Termination of all covering shall be as required to allow for pipe expansion without damage to covering, and the ends of the covering shall be fitted with protector cups.

External, Weather-exposed: All insulation installed on piping or equipment outside the building and exposed to the weather shall have two coats of finish, type as recommended by the manufacturer.

1. Insulation on piping exposed to the weather, except foamed plastic, shall be covered with an aluminum cover secured with stainless steel bands, on 12-in. centers. Covers shall overlap a minimum of 2-in. at longitudinal and transverse joints. Longitudinal joints shall be installed on the bottom of the pipe.

Unsatisfactory Installation: Unsatisfactory installation will be rejected and shall be removed and replaced. Insulation on cold surfaces shall be continuous through sleeves.

Pipe Insulation, schedule

In the following schedule:

ASJ means all service jackets, white fiberglass reinforced foil laminate.

ASJ-VB means the same as ASJ, only that the entire system shall have vapor barrier.

Service	***Pipe Size***	***Insulation***
Domestic cold water Horizontal condensate drain	½-in. – 2-in. 2½-in. & larger	½-in. fiberglass, ASJ-VB 1-in. fiberglass, ASJ-VB
Chilled water supply & return Dual temperature supply & return	2-in. & smaller 2½ -in. – 10-in.	1-in. fiberglass, ASJ-VB 1½-in. fiberglass, ASJ-VB
Domestic hot water Recirculating hot water	All	1-in. fiberglass, ASJ-VB
Hot water heating supply & return	1-in. & smaller 1¼-in. & larger	1-in. fiberglass, ASJ 1½-in. fiberglass, ASJ
Exposed fixture waste traps at handicapped accessible sinks and lavatories	All	as per ADA specs
LP Steam	1-in. & smaller	1-in. fiberglass, ASJ
LP & MP Condensate	1¼-in. – 4-in.	1½-in. fiberglass, ASJ
Condensate pump discharge	5-in. & larger	2-in. fiberglass, ASJ
HP Steam HP Condensate	1-in. & smaller 1 ¼-in. – 4-in.	2½-in. fiberglass, ASJ 3-in. fiberglass, ASJ
Roof drain bodies Horizontal roof drain piping	All	1-in. fiberglass, ASJ-VB

Types

Insulation, Flexible Foamed Plastic: Such shall be equal to Armstrong Armaflex AP, or equivalent Rubatex or IMCOA, having a K factor of not more than 0.26 BTU/in/square foot/degrees F/hour at 70 degrees F mean temperature and a flame spread rating of 25 and a smoke developed rating of 50. All joints shall be joined with adhesive.

Insulation, Hydrous Calcium Silicate: Such shall be asbestos free and have an average thermal conductivity not to exceed 0.38 BTU/in/square foot/degrees F/hour at a mean temperature of 200 degrees F. Insulation shall be Manville, Pabco or Kaylo. Blocks or preformed sections shall be firmly butted together, secured in place with metal bands on 9- to 12-in. centers and finished with a leveling coat of finishing cement.

- END OF SECTION –

22 10 00 - Plumbing Piping

22 11 23 DOMESTIC WATER PUMPS

Recirculating Pumps, domestic hot water

Standards: Bell & Gossett No. 100, ¾-in., all bronze, 10 gpm at 6 feet head; oil-lubricated type guaranteed for quiet operation; 125-pound pressure design; ground and polished steel shaft with hardened integral thrust collar; water tight seal.

Control: Provide line voltage strap-on aquastat, Honeywell or equal, 120/1/60 with 40- to 180- degree F range for pump control.

Motor: The pump motor shall be of the open drip-proof, sleeve-bearing, quiet operating type, rubber mounted, with built-in thermal overload protectors. The motor shall be non-overloading at any point on the pump curve. Motor shall be 1/12 HP, 120 volt, single-phase, 1750 rpm.

1. Furnish manual motor starter with overload protection.

22 14 29 SUMP PUMPS

Standards: All sump pumps shall be submersible and have cast iron bodies with brass impellers, discharge of 1¼-in. and 1½-in. Install a check valve above the pump as per manufacturer specifications

- END OF SECTION –

22 30 00 - Plumbing Equipment

22 35 00 DOMESTIC WATER HEATER EXCHANGERS

Standards: A. O. Smith or equivalent PVI or State electric water heater, UL listed, with fully insulated glass lined steel tank with three-year 100 percent tank warranty, anodic tank protection, and fully automatic electric element heating section. A pressure and temperature actuated relief valve shall be installed on the heater outlet with the discharge piped to the nearest floor drain.

1. Actuators and valves of tanks shall be Barber Coleman in make.

Electric storage heaters shall have a standby loss not to exceed 4 watts per square ft. of tank surface area.

Expansion Tanks, domestic hot water

Standards: Wessels Co. Model TXA, or equivalent Amtrol, constructed for 125 PSIG, tested at 150 percent WP, pre-charged 10-gallon steel tank with replaceable butyl bladder (FDA approved) expansion tank. The tank shall be a bottom NPT stainless steel system connection and a .302-in.-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank shall be fitted with lifting rings.

- END OF SECTION –

22 40 00 - Plumbing Fixtures

22 40 10 General Information

- Each plumbing fixture and drain and each equipment unit having a waste connection discharging directly into the building sanitary drainage system shall be equipped with an individual water-sealed trap installed as close as possible to the fixture, equipment or drain, unless otherwise indicated on the drawings. Furnish and install all traps required including traps not furnished in combination with the fixtures, equipment and drains. All traps shall be separately vented except where floor drains installed on vented lines will meet the requirements of the local governing authority.
    1. All fixture traps shall be 17-ga. semi-cast brass Dearborn No. 510-1 or equal. All traps in finished areas shall be chrome plated semi-cast brass and shall be fitted with chrome plated escutcheon plates.
- Water supply branches shall be no less than ½-in. All fixture water supplies shall be provided with a 15-in. high full size air chamber at the fixture, and individual fixture stops. Fixture supplies shall be adequately supported and braced to prevent movement during use. Wood wedges shall not be used as bracing. Supplies to mixing valves shall include check valves to prevent cross flow. Exposed supplies shall be chrome plated with chrome escutcheon plates.
- Fixture Support: Provide suitable supports for all fixtures. All wall-hung fixtures not supported by carriers shall be provided with backing plates and through-bolts. Water supply piping serving fixtures on metal stud walls shall be anchored to the fixture carrier, drain pipe or vent pipe at each fixture supply point.
- Trim: Trim on fixtures specified to meet ADA such as flush valves, faucet levers, and fountain/water cooler controls shall be operable by a manual activating force no greater than 5-lbs.
- Wall Supplies: Fixture wall supplies shall be installed with escutcheon plates. Exposed supplies shall be chrome plated with cast brass escutcheon plates. Wall supplies for lavatories and sinks, unless hereinafter specified, shall consist of ½-in. screwed wall supply with loose key operated angle stop valve and 3/8-in. o.d. flexible riser.
- Toilet and Urinal Partitions: See 10 21 00 Compartments and Cubicles for toilet compartment and urinal screen standards.
- Toilet Compartments shall be designed to accommodate jumbo toilet paper dispensers. See 10 28 13 Toilet Accessories.
- The design of ADA water closets with lavatory shall indicate position of jumbo towel dispenser and waste receptacle. See 10 28 13 Toilet Accessories. Locations shall be so as to minimize disposal of waste paper in water closet.
- Each building shall require one or more of the following janitorial closets, depending on building needs:
    1. Dry Storage/Disposable Closet – used for storage of paper and other disposable products. Minimum room size of 6-ft x 8-ft.

2. Floor Care Closet – used for storing floor care equipment. Closet shall have ground floor access unless elevator is large enough to transport equipment, one standard duplex electrical outlet, exhaust may be required, minimum room size of 6-ft x 5-ft.
3. Chemical Closet – Provide one chemical closet per floor, minimum room size of 6-ft x 5-ft, with the exception of first floor. First floor closet shall be no smaller than 6-ft x 12-ft in order to house flammable and corrosive cabinets. All closets shall have a slop sink , exhaust, chemical dispenser, chemical rack, and eye wash station. The slop sink will need ½" hose bib connection to cold water for chemical dispenser hook up. The chemical dispenser (provided by Northwest) will be installed above the slop sink. The chemical rack (provided by Northwest) will be located in close proximity to dispenser and will need enough room to allow locking rod assembly access.

22 42 00 COMMERCIAL PLUMBING FIXTURES

Drinking Fountains

Fixture: Elkay LZSTL8WSLP Bi-Level water cooler with filter and bottle counter. Fixture shall be wall mounted and designed to meet ADA requirements. For replacement of single fixtures, Elkay LZS8WSLP with filter and bottle counter shall be used.

Hand Dryers

See 10 28 00 Toilet Accessories for hand dryer standard.

Janitor Mop Sinks

Fixture: Florestone MSR-2424 Molded Mop Receptor. Fixture shall be a molded, one-piece unit and floor mounted.

Faucet: American Standard 8344.012 exposed yoke wall-mount utility faucet. Fixture shall be made of cast brass construction with chrome finish. Shall include bucket hook, top brace, and metal lever handles. Shall feature vacuum breaker and offset shanks with integral stops.

Wall Cover: Install on walls behind each janitor sink a 12-in. FRP (Fiberglass Reinforced Panel) backsplash. Covering shall be continuous around corners and shall overlap tiling flanges.

Lavatory

Fixture: American Standard "Lucerne", 0356.015, 20-in. by 18-in., vitreous china, wall hung, splash back, for concealed arm carrier. Fixture shall conform to ADA guidelines

Fittings: Sloan SF2150-4, grid drain, aerator, and mixing valves.

Shower Fittings

Fittings: Shall be of Delta Monitor Series, model 1325 (Chrome) or 1345 (Chrome IPS); equivalent of American Standard may be used interchangeably. Fitting shall be pressure balanced.

- *For tubs and shower units see Tub and Shower Enclosures in section 10 28 16.*

Valves

All valves shall have built-in screwdriver stops or shut-off valves to allow valve repair on an active line.

Sinks, general

Multiple sink installations shall be braced to the floor but shall not use pedestals to do so.

Sinks

Fitting: Delta or American Standard in make.

Fixture: American Standard in make.

Sinks, single control

Fixture: American Standard in make.

Fittings: Kitchen style – Delta single handle control kitchen faucet. Model shall be approved by Northwest Facility Services

Bathroom style – Sloan SF2150-4, grid drain, aerator, and mixing valves.

Sinks, commercial

Fixture: Elkay in make. Fixture shall be stainless steel.

Fittings: T&S Brass or approved equal by Northwest Facility Services. If faucet is installed on a multi-compartment sink, the faucet shall be long enough to extend into each compartment by a minimum of 6”

Disposers

Disposers, if approved by Northwest Facility Services: In-Sink-Erator Model 333/SS, ½ HP, 120/1/60, reversing, stainless steel body.

When disposal is used in conjunction with a double basin sink a sanitary “Y” with adequate baffling to prevent splatter to the adjacent sink must be used.
When sinks share a common vertical riser a sanitary “Y” or “T” with adequate baffling to prevent splatter to the adjacent sink must be used.

Urinal, option 1

Carrier: Wade W-400-AM11-M36 chair carrier with bearing plate.

Fixture: American-Standard "Trimbrook", 6561.017, vitreous china, wall hung, extended sides, siphon jet, flushing rim, 1.0 gallon per flush.

Supplies: Sloan No. 186 flush valve with screwdriver stop and vacuum breaker. Handle shall be removed and replaced with Sloan side mount 3325500 touchless controls.

Urinal, option 2

Carrier: Wade W-400-AM11-M36 chair carrier with bearing plate and rectangular upright supports.

Fixture: American-Standard "Allbrook", 6541.132, vitreous china, wall hung, siphon jet, flushing rim, 1.0 gallon per flush. Install with top of front 17-in. AFF. Fixture shall conform to ADA guidelines.

Supplies: Sloan No. 186 flush valve with screwdriver stop and vacuum breaker. Handle shall be removed and replaced with Sloan side mount 3325500 touchless controls.

Water closet, option 1

Fixture: American Standard, elongated bowl, vitreous china, siphon jet, floor mounted, 1½-in. top spud, 1.6 gallons per flush.

Seat: Church, elongated, white, heavy-duty solid plastic front with stainless steel check hinge.

Supplies: Sloan No. 110 water saver flush valve with screwdriver stop and vacuum breaker. Provide Sloan No. YK solid ring pipe support. Handle shall be removed and replaced with Sloan side mount 33215501 touchless controls.

Water closet, option 2

Fixture: American Standard, vitreous china, elongated bowl, tank type, free standing, siphon jet action, close coupled, 1.6 gallons per flush. Fixture shall conform to ADA guidelines.

Seat: Church, elongated, white, solid plastic, open front, without cover.

Supplies: Sloan No. 110 water saver flush valve with screwdriver stop and vacuum breaker. Provide Sloan No. YK solid ring pipe support. Handle shall be removed and replaced with Sloan side mount 33215501 touchless controls.

- END OF SECTION –

Division 23 – HVAC

23 05 00 - Common Work Results for HVAC

23 05 13 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

Control Devices

All HVAC controls shall be BACNet compatible, allowing for connection to the current Building Automation System.

Motors

Each motor 15 HP and less shall be manufactured by Century, GE, Westinghouse, or Louis Allis. One-half horsepower and larger motors shall be three-phase, 60 Hertz, 208 volt unless specified or noted otherwise on the drawings. Smaller motors shall be 115 volt, single phase unless specified or noted otherwise.

Starters

A motor starter shall be furnished with each motor. Except where manual starters are specified, magnetic starters shall be furnished. Starters shall be manufactured by Square D, GE, Westinghouse, Allen-Bradley or Furnas.

Each magnetic starter shall, unless otherwise indicated, be combination type with a disconnect switch (non-fused, if motor is individually protected at panel). Each magnetic starter shall have auxiliary contacts as required and Hand-Off-Auto switch or start-stop-pushbutton as required for specified operation in cover. Starters on Electrical systems above 250 volts shall include control voltage transformers. Single-phase motors on equipment indicated for automatic control shall be furnished with magnetic starters.

All starters shall be equipped with manual reset type thermal overload protection on each phase sized in accordance with NEC requirements.

Starters located indoors in dry locations shall have NEMA 1 enclosures. Starters located outdoors or in wet locations shall have NEMA 3R enclosures.

- END OF SECTION –

23 07 00 – HVAC Insulation

23 07 00 HVAC INSULATION

Ductwork Insulation

Service	*Insulation*
Converters Hot water storage tanks & heaters	2-in. calcium silicate block, ½ in. insulating cement over wire mesh and finished with glass cloth.
Rolaitrol Tanks	1½-in. rigid fiberglass, ASJ jacket.
Exposed or concealed ductwork: *Outside air* *Relief air*	1½-, 3-lb. rigid fiberglass board, vapor barrier faced, with heavy-duty foil-scrim-kraft facing.
Concealed ductwork: *Outside air* *All round supply air ductwork; and transitions from branch ducts to terminal boxes*	1½-in., l-lb. fiberglass blanket vapor barrier faced, heavy duty foil-scrim-kraft facing.
Exposed or concealed ductwork: *Supply/Return - Interior Insulation for applications where noise or space are a consideration*	1-in. foil faced fiber board

23 09 00 - Instrumentation and Control for HVAC

23 09 10 GENERAL INFORMATION

- *(Note: Utilize Northwest Missouri State University Controls Specification for the above CSI division – See Appendix A.)*

    - Provide a complete Direct Digital Control (DDC) system that integrates seamlessly with the Niagara N4 software framework at the Master Service Integrator (MSI) Level, as detailed in the 25 50 00 GDC. The system shall include all necessary sensors, transmitters, control modules, and communication link wiring, utilizing the BACnet protocol to ensure interoperability with existing systems and smooth integration with the current infrastructure. All instruments shall be fully field adjustable as to set point, sensitivity ratio, and reset ranges. Furnish, install, and adjust all equipment required for precise regulation of temperatures and conditions. All Controls shall be DDC (Direct Digital Control) rather than pneumatic and must be within the 2 most recent generations of hardware and software. Any exception must be approved by Northwest Facility Services.

    - Applicable providers include ALC (Automated Logic), JCI (Metasys), and Schneider (EcoStruxure). Manufacturers of equivalent equipment can be proposed, but approval requires detailed technical submissions. Integration services and programming for Tridium N4 Supervisor or newest stable Niagara version must be contracted through NWMSU's approved Master Service Integrator (MSI), which is also approved for building-level controls as an authorized vendor.

Communication Framework

- The system framework shall utilize BACnet/IP for building controllers as the primary communication method, ensuring centralized monitoring and integration through the Tridium N4 Supervisor. BACnet MS/TP communication shall be used for zone-level controllers managing localized systems or in areas with limited Ethernet infrastructure. All controllers and devices must adhere to ASHRAE/ANSI Standard 135, with Ethernet-based connections providing high-speed reliability for IP-based systems.

- Wiring requirements for BACnet MS/TP communication include the use of shielded, twisted-pair cables with a characteristic impedance of 100 to 120 ohms and distributed capacitance below 30 pF per foot. The maximum segment length is 4,000 feet with AWG 18 cable, adhering to EIA-485 electrical specifications. Each segment supports up to 32 nodes, with repeaters required for additional nodes. Connections must follow a daisy-chain topology to ensure proper signal transmission and avoid reflection issues. For BACnet/IP, Ethernet-based infrastructure is recommended, utilizing Cat6A or newest generation of approved communication cabling for high-speed and reliable communication. All wiring must comply with NEC standards and be tested for continuity and proper termination.

Warranty

- All HVAC equipment and associated controls shall meet industry standards for durability and performance. A minimum one-year (1) warranty is required, covering parts, labor, and system functionality. Any defects or failures during this period must be resolved by the contractor at no additional cost to the owner. The warranty should also include provisions for firmware updates and system reliability assurances to maintain operational integrity.

23 09 13 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

- *(Note: Utilize Northwest Missouri State University Controls Specification for the above CSI division – See Appendix A.)*

Safety, Interlocks, and Shutdown Controls

- Safety shutdowns and interlock requirements ensure equipment deactivation during hazardous conditions. Duct smoke detectors must interlock with air handlers for shutdown, while smoke and fire dampers are interlocked for isolation as specified in the Sequence of Operation. Safety switches, including smoke detectors, freezestats, high/low-static pressure cut-offs, and damper end switches, must be hard-wired to de-energize equipment. Pressure and temperature safety switches require manual reset and must provide contacts for monitoring their status through the DDC system.

- All above detailed safety shutdown features and any directed by the University or the University's representative shall initiate an alarm to the controller of the affected air handler unit, this alarm shall activate on the MSI layer of the Niagara4 supervisor as well.

Controls Furnished by Others, calibration of

- Factory package controls shall be integrated into the DDC system design and installation. Packaged control equipment must be included in network layouts and schematics, interfacing seamlessly with the DDC system for compatibility and efficient operation. All available points from packaged controllers must be made accessible to the MSI for integration into the Tridium N4 Supervisor. Packaged systems must adhere to specified communication protocols and be fully documented in submittals.

Damper Operators

- Damper actuators operate using control signals such as 0-10 VDC voltage or 4-20 mA current, with feedback mechanisms to confirm damper position. For fail-safe operation, spring-return actuators use stored mechanical energy to return dampers to a default position during power loss. Proper installation and calibration are essential for ensuring smooth operation and compatibility with the control system.

Electric Wiring for Control

- The control company is responsible for providing all wiring required for the control system, ensuring compliance with Division 23 specifications and all applicable electrical codes.

Miscellaneous Equipment

- Contractors must provide all supplementary items necessary for a complete, functional, and secure installation, even if not explicitly stated in the plans. Coordination with other trades is required to avoid installation conflicts, and all work must meet industry standards, NEC, and local codes. All equipment must be new, defect-free, properly labeled, and compliant with applicable standards. The installation must ensure seamless integration with the control system and long-term system reliability. Example of such items are listed but not limited to:

    - *Freezstats are of sufficient length to properly protect the coil it is installed on, enclosures are of sufficient size and type to protect controls and devices in the area they are installed, etc.*

Thermostats/Temperature Sensors

- System design shall require thermostats to be compatible with the installing manufacturer system and preferred that they remain brand specific to the installed system. Equivalent thermostats from other manufacturers may be proposed, provided detailed technical submissions are furnished and approved in accordance with project requirements.

23 09 23 DIRECT DIGITAL CONTROL SYSTEMS FOR HVAC

- *(Note: Utilize Northwest Missouri State University Controls Specification for the above CSI division – See Appendix A.)*

Energy Management System, existing

- Energy management is achieved through the Direct Digital Control (DDC) system integrated with the Niagara N4 Framework. Building controllers communicate via BACnet/IP protocols for centralized monitoring and control, optimizing HVAC operations and system-wide performance. Features like scheduling, trending, alarm handling, and centralized analytics provide tools for energy efficiency and sustainability. This method is to comply with the Northwest Missouri State University's Energy Management Policy.

Integration and Interoperability

- DDC hardware and software should comply with BACnet protocol (ASHRAE 135) for interoperability. Standardize naming with BRICK schema and ASHRAE Standard 223P. Use BACnet/IP for scalable communication across campus controllers.

System Redundancy and Resilience

- Critical systems as determined by the University must avoid single points of failure with redundant controls and power sources. Controllers should have UPS power, and alarms must follow priority levels for operational resilience.

Scalability and Capacity Planning

- Controllers should allow future expansions with spare I/O points (e.g., three (3) universal inputs and outputs). FLN networks should not exceed 50% node capacity, and building controllers must remain under 30% utilization.

Accessibility and User Features

- Implement multi-level security access (guest, operator, engineer, administrator). Provide non-proprietary, web-based system access with user-friendly graphical interfaces for monitoring and control.

Documentation and Compliance

- Detailed submittals should include control points lists, control loop documentation, and compliance with FCC Class A standards to mitigate interference in commercial environments.

Energy Efficiency

- Energy management should use algorithms like time-of-day adjustments, temperature setbacks, and supply air resets. Major equipment should utilize Proportional Integral Derivative (PID) control for efficient performance. This method is to comply with the Northwest Missouri State University's Energy Management Policy.

Data Management

- Trend all inputs and outputs at adjustable sample times and store data in standard database formats for compatibility with third-party tools. Centralize data on a BAS server or historian.

Durability and Future-Proofing

- Specify surge protection, optical isolation, and battery-backed memory for controllers. Firmware updates should be included for one year to ensure system sustainability.

- This streamlined version maintains all critical points while enhancing clarity and focus for a general design condition.

23 09 24 GRAPHICAL USER INTERFACE INTEGRATION

- *(Note: Utilize Northwest Missouri State University Controls Specification for the above CSI division – See Appendix A.)*

System Description

- The Building Automation System (BAS) Graphical User Interface (GUI) will operate on a web-server environment, using BACnet/IP over the Enterprise Ethernet network for seamless communication. The GUI software must allow remote alarm notifications via text, email, and alphanumeric messages, and provide transparent system access through standard web browsers for monitoring and control.

Software Requirements

- The web server software will support real-time, dynamic graphical control of HVAC, plumbing, and lighting systems, including alarms, scheduling, and trending. Data historian software must integrate with Microsoft SQL Server, support at least five users, and enable long-term storage and retrieval.

Graphics

- Graphics must be user-friendly, with consistent color schemes, hierarchical navigation, and clear real-time status indicators. Users must have the ability to customize displays and access features like alarms and overrides directly from the interface.

User Access and Permissions

- Access will be tiered across four levels—Guest, Operator, Engineer, and Administrator—each with defined permissions. An adjustable auto-logout feature enhances security, ensuring inactive users are automatically logged off.

Data Management

- Trend data will be logged at BAS controllers before uploading to the central server for long-term storage. Archival systems must accommodate mass storage devices, ensuring data availability without overwriting logs.

Testing and Performance

- Comprehensive commissioning and performance tests will verify functionality through control checkout and point-to-point verification. Archived activity logs must be maintained for a minimum of two (2) years to support system analysis and troubleshooting.

23 09 93 SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

General Information

- All sequence of operations shall be based upon the ASHRAE 36 Guideline for High Performing Sequences. Sequences are to be developed by any of the following or in conjunction with:
  - Engineer of Record (EOR)
  - Building Level Control Vendor
  - MSI
- Sequences are to be approved by the University or the University's representative.

Control Points

- All control points will be required to be determined prior to any install, programming, or controls engineering either by the installing controls vendor or the EOR and must be included in the submitted Sequence of Operations for review. Points will need to be identified to which function they are communicating to. The points list for all controls is required to be maintained.

Control Diagrams and Layout

- Control diagrams and layout shall be clearly defined by the installing control's vendor as to where each point lands on the controllers for reference. Each device type by sequence shall be listed on the applicable submittal for that sequence of operations. As-builts to be provided to the University and applicable MSI vendor for upload to the MSI system.

Sequence Development

- Prior to any install, programming, or control engineering all sequence of operations must be submitted by the installing controls vendor to the University and/or the University's representative for review and approval. All sequences must be based upon ASHRAE Guideline 36. If deviation is required review following statement.

Specialized Sequence

- In instances where the University installs, maintains, or acquires equipment that does not poses an ASHRAE 36 guideline for its sequence the EOR will formulate a points list and formulate a sequence, approval will be by the University or the University's representative.in coordination with the MSI and Building Level control vendor.

- END OF SECTION -

23 30 00 - HVAC Air Distribution

23 30 10 General Information

- Provide all manual dampers with locking quadrants required to properly balance the systems.
- Specifications: Sheet metal shall be the galvanized sheet steel of lock-forming quality, with galvanizing coating. Aluminum shall not be used for ductwork. All angle iron used for support shall be galvanized.
- Transitions in ductwork shall be constructed with angle of change in size at not more than 15 degrees unless otherwise approved by Northwest Facility Services. Ductwork and housings shall be air-tight under all pressures that occur in the system. Do not cross break ductwork. All elbows or offsets in rectangular ductwork under positive pressure that exceed 33 degrees shall contain turning vanes. Sweep elbows with a centerline radius equal to or greater than the duct width may by used without vanes.
- The supply ductwork on systems utilizing terminal boxes shall be constructed under medium pressure construction requirements from the discharge of the unit up to the inlet connection on the terminal box.
- All ductwork shall be reviewed with Northwest Environmental Services to determine whether galvanized or stainless steel is appropriate for the individual application. Potential stainless steel ductwork shall include, but not be limited to, kitchen exhaust systems and corrosive exhaust systems.
- All equipment shall be provided such that it is capable of being integrated into the Johnson Controls Metasys Building Automation System without changeout of control components. Any exceptions shall be approved by Northwest Facility Services.

23 31 00 HVAC Ducts and Casings

Flexible Connections

General: Duct connections to fans shall be sound isolation flexible connections made with "Ventglass" neoprene coated glass fabric as manufactured by Ventfabrics, Inc. Connections shall be not less than 4-in. long, shall have suitable metal collar frame at each end and shall be made with at least a 1-in. slack in material to prevent transmission of vibration. All connections shall be sealed with duct sealer.

Liner

Ductwork systems, as scheduled below, shall be lined with 3-pound density duct liner complying with NFPA 90A, flame spread under 25, smoke developed under 50 and fuel contributed under 50. Duct liner shall be neoprene coated, rated for velocities up to 4,000 fpm.

1. Make: Shall be Certain-Teed Products No. 300 Ultra-Lite or Owens-Corning No. 300 Aeroflex.

Application, Specification of: Duct liner shall be applied in the following systems or specified portions thereof:

1. All rectangular supply and return ductwork
2. All rectangular outside air ductwork
3. All rectangular mixed air ductwork
4. All rectangular relief air ductwork
5. All rectangular exhaust ductwork (1/2" thick)
6. In housing and casings and plenums

Coating: All exposed edges of liner shall be coated with Benjamin Foster 30-36 or 85-20 or equal product of 3M. Exposed edges of liner shall be coated at all joints prior to duct assembly. Duct liner shall have metal nosing installed on the leading edge of the liner where the edge is exposed to the air stream.

Dimensions: Duct liner shall be applied to flat sheet with 100 percent coverage of Benjamin Foster 85-20 adhesive or 3M No. 37 adhesive. In all housings, casings and plenums and on horizontal runs, ducts over 12-in. in width or over 16-in. in height shall be additionally secured with Gripnail or welded pins and speed clips on 15-in. centers. On vertical runs, Gripnail or welded pins and speed clips shall be spaced on 15-in. centers on all ducts wider than 12-in. Mechanical fasteners shall start within 2-in. of the leading edge of each section. Mechanical fasteners shall be flush (and flush only) with liner surface.

1. Liner applied to supply, return or exhaust ductwork shall be 1-in. thick. Liner applied to outside air intake ducts, and all housings, casings and plenums shall be 1-in. thick.

Round Duct, flexible, insulated

Length: Flexible ducts shall be no longer than 8 ft., 0 in.

Make, Low-pressure Systems: Flexible duct in low-pressure systems shall be Thermaflex M-KE or equivalent Clecon, Certain-Teed or Flexmaster. It shall be rated for pressures to 6 in. w.c. and temperatures of 0 to 180 degrees F.

Make, Medium-pressure Systems: Flexible duct in medium pressure systems shall be Thermaflex M-KC or equivalent Clecon, Certain-Teed or Flexmaster. It shall be rated for pressures to 10-in. w.c. and temperatures -10 to 200 degrees F.

Specifications: Use duct manufacturer's best quality clamps for each application. Joint treatment shall utilize metal adjustable clamping devices, screw operated, or Panduit duct clamps having 175-lb. tensile strength and listed under UL Class I when installed in accordance with the manufacturer's instructions. For medium and high-pressure service use Benjamin Foster Duct Sealer No. 30-02, or equal at connection shall be used..

23 33 00 AIR DUCT ACCESSORIES

Access Panels and Doors for Ductwork

Hinged access doors shall be installed in housings where required for access to equipment. Insulated doors shall be installed in insulated or lined housings.

Access doors shall be installed in ductwork where required for access to fire dampers, smoke damper, etc. Insulated access doors shall be used where installed in insulated or lined ductwork. Ductwork access doors shall be constructed to the pressure rating of the ductwork in which the access door is installed. Access doors shall be constructed using type 1 or type 2 locks only.

Screwed access panels shall not be used.

Dampers

General: Automatic dampers shall be provided unless otherwise approved by Northwest Facility Services.

1. Standards: Dampers shall be Ruskin CD-35 or approved equal. Dampers shall have 2- by 1- by 18-in. steel channel frame, 16-gauge steel blades, Oilite bronze bearings, cadmium plated shafts and blade and jamb seals.
2. Dampers for control of outside air and relief air shall be Ruskin CD-50, or approved equal, extruded aluminum, low leakage damper, parallel blade design with nylon bearings and blade and frame seals on all mating surfaces; damper leakage shall not exceed 6 CFM per square foot at 4-in. water column.
3. All other dampers shall be Ruskin CD-35 or equal as approved by Northwest Facility Services with 16-gauge steel blades, steel channel frame, oilite bronze bearings, cadmium plated shafts and blade and jamb seals. Sectionalize outside air dampers as required to accurately provide the minimum outside air cfm, independent of the maximum outside air dampers.

Access Doors: Access doors shall be provided in the ductwork in an accessible location, for all dampers.

Dampers, Backdraft: Such shall be Ruskin BD6 or approved equal, with 2¼- by 7/8- by 1/8-in. aluminum channel frame and 0.070-in. aluminum blades with extruded vinyl edge seals and Oilite shaft bearings.

Dampers, Gravity Relief: Gravity relief dampers shall be Ruskin CBD6 or approved equal, with 2¼- by 7/8- by 1/8-in. aluminum channel frame and 0.070-in. aluminum blades with extruded vinyl edge seals and Oilite shaft bearings. Blades shall incorporate an adjustable counterbalance and shall be suitable for horizontal or vertical mounting.

Dampers, Fire: Such installed in construction rated 2 hours or less shall be Ruskin IBD, Prefco, Safe-Air, Tuttle & Bailey, or approved equal, UL listed, folding blade type horizontal and vertical mount. Such dampers shall have integral 14-gauge sleeve, 18-gauge steel damper blades, stainless steel spring operator (horizontal mount) and UL fusible link. Mount dampers in accordance with their listing and where required by governing fire codes. Fire dampers in medium- and high-pressure ductwork shall have the folded blades completely out of the airstream. Fire dampers in low-pressure ductwork may have the folded blades in the airstream.

Dampers, Manual Balancing: Such shall be Ruskin MD35 or approved equal, with 5" x 1" x 16-gauge galvanized steel channel frame and 16 gauge galvanized steel blades with molded synthetic shaft bearings. Linkage shall be arranged for opposed blade operation and shall be furnished with locking hand quadrant.

Dampers, Outside Air and Relief: Outside air dampers and relief air dampers shall be Ruskin CD-50, or Penn BD-10 extruded aluminum, low leakage damper, parallel blade design, with nylon bearings and blade and frame seals on all mating surfaces.

Leakage Limits: Damper leakage shall not exceed 6 CFM per square foot at 4-in. water column, tested in accordance with AMCA Standard 500.

Silencers

Rectangular duct silencers shall be Industrial Acoustic Co. or equivalent Vibro-coustics or Enelco rectangular silencers with minimum 22-gauge galvanized steel outer shells and perforated 22-gauge galvanized steel inner shell designed for a smooth bell-mouth entrance and exponential exit. Acoustical performance and air pressure drop characteristics shall be equal to the published data of Industrial Acoustic Co. Silencers shall be Type LBB and LBC, 60 in. long. Pressure drop at 1000 fpm shall not exceed 0.5 in. w.c., and insertion loss shall not be less than 25 dB in the third band.

23 34 00 HVAC FANS

Cabinet Fans

Standards: Penn Zephyr or equivalent Greenheck, Carnes, Cook or Jenn Air in-line fans, steel construction, complete with motor, centrifugal fan, and housing. Fan, motor and wheel assembly shall be removable without disturbing the housing. Fan shall be mounted on vibration isolators. Furnish gravity type back draft damper for each fan. Suspend fans with rubber-in-shear type vibration isolators. Fans shall be furnished with multiple speed control to be determined during design.

In-line Fans

Standards: Greenheck SQ Series or equivalent Acme or Cook, square in-line fans, heavy gauge galvanized steel housing, complete with motor, aluminum centrifugal fan, and an inlet cone on the fan housing. Housing shall have hinged or removable service doors for access to all internal parts. Belt drive units shall have an externally mounted motor, belt guard, adjustable motor base, and adjustable V-belt drive. Drive shall be completely isolated from the air stream. Furnish gravity-type back draft damper for each fan and inlet screen. Suspend fans with rubber-in shear type vibration isolators.

1. Furnish combination-type magnetic starter with in cover for each three phase fan and flush mounted manual starter with pilot light for each single-phase fan. Single-phase fans scheduled for start-stop control by digital controllers shall be furnished with magnetic starters.

23 36 00 AIR TERMINAL UNITS

Reheat Boxes, single duct, variable volume

Standards: Environmental Technologies SSD or equivalent Titus, or Carnes single duct, pressure independent variable volume terminal box. Box shall be factory-assembled and shall consist of a galvanized steel casing with thermal and sound attenuating lining, direct and constant volume controller for direct acting, normally open operating sequence.

1. Box sizes and capacities shall conform to the schedule below.

Mark	***Inlet***	***CFM Range***
A	6-in. rd.	0 to 450
B	8-in. rd.	455 to 800
C	10-in. rd.	805 to 1350
D	12-in. rd.	1355 to 2000
E	14-in. rd.	2005 to 2500
F	16-in. rd.	2505 to 3200

Coils: Electric or hot water reheat coils may be used. Reheat hot water coils shall be factory mounted, hot water serpentine type, copper tube, aluminum fins. Control valves shall be sized to produce a pressure loss not to exceed 3 psig. Nominal body rating shall be not less than 125 psi. A valve operator shall be provided for each valve and shall be of sufficient capacity to operate the valve under all conditions.

Control: The terminal box manufacturer shall install all brand specific to project auxiliary control devices necessary to achieve the terminal control sequence described.

Terminal Boxes, single duct, variable volume

Standards: Environmental Technologies SDR-SSD or equivalent Titus, or Carnes, single duct, pressure independent variable volume terminal box. Box shall be factory assembled and consist of a galvanized steel casing with thermal and sound attenuating lining, direct and constant volume controller for indirect acting, normally operating sequence. Box sizes and capacities shall conform to the following schedule:

Mark	***Inlet***	***CFM Range***
A	6-in. rd.	0 to 450
B	8-in. rd.	455 to 800
C	10-in. rd.	805 to 1350
D	12-in. rd.	1355 to 2000
E	14-in. rd.	2005 to 2500
F	16-in. rd.	2505 to 3200

Inspection: Upon completion of the project and prior to final inspection, the terminal box manufacturer's representative shall inspect each terminal and certify in writing that the terminals are properly installed and that the controller is properly set and functioning.

Motor: Unless otherwise noted, boxes shall be single motor, designed to control down to a minimum limit of 0 percent of volume.

23 37 00 AIR OUTLETS AND INLETS

Diffusers, Grilles, and Registers

General: Make shall be Titus, Barber Colman, Krueger, Price or Carnes. All flange mounted ceiling or wall mounted units shall be set with rubber gaskets for airtight connection with the mounting surface. All ceiling and wall-mounted units shall have an enamel finish with color to be determined during design. All register, grille and diffusers shall meet or exceed the air performance and noise criteria ratings of those specified below. Replace units, which are found to be deficient in this respect.

1. Grilles and diffusers shall be positively attached to the ceiling suspension main runners or to cross runners with same carrying capacity as the main runners.

Diffusers, Supply, Ceiling (SD): Such shall be as specified below.

SD-1	Titus type TMS, square, louver face, fixed pattern, with straightening vanes. Provide frame to match architectural ceiling type. Provide type 3 frame for lay-in T-Bar ceiling installation.
SD-2	Titus type TMS, square, louver face, fixed pattern, with straightening vanes. Provide Type 1 frame for surface mount installation.

Grilles, Return (RG): Such shall be provided with frame to match architectural ceiling type and shall be as specified below.

1. Titus type PAR, square, perforated face. Provide Type 3 frame for lay-in T-bar ceiling application.
2. Titus type PAR, square, perforated face. Provide Type 1 frame for surface mount installation.

Registers, Exhaust: Such shall be as specified below.

ER-1	Titus type 8-F5, square, perforated face, aluminum with 1¼-in. flat margin and key operated opposed blade volume damper.

Registers, Supply (SR): Such shall be as specified below.

SR-1	Titus type CT-580, linear bar type, extruded aluminum construction with No. AG-35 multi-blade key operated volume damper, 1/2" bar spacing and type 1-A mounting; 26.

Ducts, painting at grilles and registers

The interior of all ducts without liner that can be seen through grilles shall be coated with dead black paint applied to clean surfaces.

Louvers

Standards: Ruskin ELF811S, Penn, or equal as approved by Northwest Facility Services, all-aluminum stationary blade louver with 4-in. extruded 0.125-in. aluminum box frame with mitered corners, 0.125-in. extruded aluminum weatherproof blades, maximum 4-in. on center and ½-in. mesh aluminum bird screen. Intermediate blade supports shall be on the rear of the blade only. Louvers shall have baked acrylic enamel from manufacturer's standard colors.

1. Blank-off any unused portions of the louver with lined sheet metal panels. Back of the panels shall be insulated with 1-in. thick, 3-lb. density duct liner. Seal all joints on back panel airtight.

23 38 13 COMMERCIAL KITCHEN HOODS

- Exhaust Hoods: Hoods in food service or chemical areas shall be stainless steel. Hoods in all other areas shall be galvanized steel.

- END OF SECTION –

23 40 00 - HVAC Air Cleaning Devices

23 40 00 HVAC AIR CLEANING DEVICES

Air Filters, pleated

Standards: Farr 30/30 or equal American Air Filter, Cambridge or Continental, 2-in. thick, medium efficiency, pleated disposable type filters. Each filter shall consist of filter media with support grid and enclosing frame, UL listed, Class II. All filter units shall have one new set of filters installed at the time of Northwest's acceptance and one additional spare set delivered to Northwest.

Efficiency: Filters shall have a minimum average efficiency of 25 to 30 percent. Media resistance shall not exceed 0.40-in. w.c. at 500-fpm velocity.

Holding Frames: Filter holding frames are supplied with the air unit.

- END OF SECTION –

23 60 00 - Central Cooling Equipment

23 63 00 REFRIGERANT CONDENSERS

Condensing Units, air-cooled

General: Compressors over 5 hp shall be reciprocating, serviceable hermetic, unloading type with oil pump, crankcase heater, service valves and shall be spring isolated. Condenser coils shall be copper tube, aluminum fin construction. Condenser fans shall be propeller type, quiet operating with fan guards and integral thermal overload protection. Condensing units under 5 hp could have scroll compressors substituted.

Capacity: Such shall be at 105 degrees F ambient temperature. The condensing unit shall be by the same manufacturer as the associated air-handling unit. The system capacity shall be equal to that specified for the associated air-handling unit.

Control: Unit mounted control panel shall contain high and low pressure cutouts, motor high temperature cutout, motor starters and control voltage transformer.

Make: Daikin, Trane, York, ALP Series or equivalent, factory assembled air cooled condensing unit consisting of compressor(s), condenser coils, fans and controls all encased in a galvanized steel casing with baked enamel finish.

Supports: Furnish and install Pate, or equal as approved by Northwest Facility Services, model ES2 equipment supports for condensing unit mounting.

Location: Whenever feasible condensing units should be located at ground level with natural “when possible” or man-made enclosures for an aesthetic appearance. All enclosures shall be approved by Northwest Facility Services.

- END OF SECTION –

23 70 00 - Central HVAC Equipment

23 73 00 Indoor Central Station Air Handling Units

Air Handling Units

Standards: Air handler units shall be completely factory-assembled, including coil, condensate drain pan, fan motor, filters, and University compatible controls in a horizontal configuration insulated casing. Air handler units and heat pumps shall be of the same manufacturer.

1. Make: Trane, Lennox, Carrier, Daikin, or approved equivalent air handlers for split system heat pumps.

Casing: Unit casing shall be constructed of zinc-coated, heavy-gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. The casing is completely insulated with fire-retardant, permanent, odorless glass fiber material.

Control, Thermostats: All thermostats shall utilize a ten kilo-ohm thermistor style unit, 0-5 VDC, 3-wire (Lini-Temp) sensor, or approved equivalent. RTD style thermostats must not be used.

Electric Heaters: UL-approved electric heat modules shall be available for installation directly on fan discharge. Heaters shall be single, two or three-stage control, or 4-20 milliamp SCR control single-point electric power connection and terminal strip connections. Electric heater elements shall be constructed of heavy-duty nickel-chromium elements internally delta connected on 208/240 volt, three-phase. Each 208/240-volt heater shall have a pilot duty with secondary backup fuse-links for automatic reset of high limit controls.

Mounting: Air handlers shall be mounted on a field-built sub base with a horizontal front access frame.

Specifications, System: Knockouts shall be provided for unit electrical power and refrigerant piping connections. Captive screws shall be standard on all access panels. Shall reduce transmission of noise and vibration to building structures, equipment, and adjacent spaces. Packages shall be neoprene-in shear in-floor mountings. The units shall have a single refrigeration circuit. Each refrigeration circuit is controlled by a factory installed thermal expansion valve. Configured aluminum fin surface shall be mechanically bonded to 3/8” internally enhanced copper tubing and factory pressure and leak tested at 375 PSIG. The coil is arranged for draw-through airflow and shall provide condensate drain pan constructed of PVC plastic and provide external connections on either side of the unit. Double inlet, double-width, forward curved, centrifugal-type fan with adjustable belt drive shall be standard. Thermal overload protection shall be provided on all motors. Fan and motor bearings shall be permanently lubricated. Magnetic evaporator fan contactor, low voltage terminal strip, check valve, and single-point power entry shall be included. All necessary controls shall be factory-installed and wired.

Specification, System Control: All control systems must be fully compatible with the University temperature control central system (currently Johnson Controls Metasys). No proprietary controls, controller, or software is to be substituted or used.

Air Handling Units, packaged

Coils: Coils shall be made with aluminum fins mechanically bonded to copper tubes, shall be encased in rigid galvanized steel frames, shall be tested to 300 PSIG air pressure underwater, and shall be suitable for 200 PSIG working pressure. Tubes shall be staggered in the direction of airflow. Provide closure plates for pipe openings through the unit casing. Coil fin spacing shall not exceed ten fins per inch.

Drain Pans: Unit with cooling coils shall include drain pans made of stainless steel metal, welded, internally insulated with foam plastic with a mastic coating to prevent external sweating, and arranged to prevent moisture carryover.

Fan: The fan section shall have centrifugal type double inlet fans mounted on a common shaft supported by self-aligning ball bearings selected for an average life of 200,000 hours at maximum design rating. The shaft shall operate at speed substantially below its first critical speed. The fan wheel and the fan shaft assembly shall be statically and dynamically balanced. The unit shall operate without leakage, excessive noise, or vibration under every operating condition. Fan wheels shall be forward type. Units on variable flow systems shall be installed with variable frequency drives.

Fan Drives: Such shall be V-belt with matched belts, cast iron sheaves, and selected for 150 percent of the motor capacity. Motor sheaves shall be adjustable except on motors 20 HP and larger, sheaves may be fixed. Sheaves shall be adjusted or replaced until the required system air balance is achieved.

Fan Motor: Units scheduled with variable frequency drives shall have their starters furnished with the drive assembly.

Filter: Filter sections shall be angle type, for low velocity, with 2” thick pleated throwaway filters, and include hinged access doors on both sides of the filter box. Furnish one initial set of filters and one complete replacement set for each filter box.

Housing: The unit shall be housed in a galvanized double-wall insulated steel enclosure with a rigid welded angle-iron reinforcing frame painted with zinc chromate primer. The unit shall be sectionalized as required for the configuration and space limitations. Access to fan and coil sections and to any other components requiring inspection, lubrication, or maintenance shall be available through hinged access doors. The unit shall be furnished with a mounting rail base.

Housing, Lining: Double wall unit housing shall be lined with ¾-“thick, 3 pounds per cubic foot density duct liner with neoprene air side coating meeting fire hazard requirements and shall be securely fastened to the housing.

Mounting: Air units not internally isolated shall be mounted with spring vibration isolators. Units designed for internal isolation shall isolate the fan and drive assembly from the unit casing and frame using spring isolators.

Specification, System Control: All control systems must be fully compatible with the Johnson Controls Metasys Building Automation System. No proprietary controls, controller, or software are to be substituted or used.

- END OF SECTION –

23 80 00 - Decentralized HVAC Equipment

23 81 00 DECENTRALIZED UNITARY HVAC EQUIPMENT

Heat Pumps, general

Standards: Units shall be assembled on heavy-gauge steel mounting/lifting rails and shall be weatherproofed. Unit shall include a hermetic reciprocating compressor, plate fin condenser coil, fans and motors, controls and holding charge of 410A. Operating Range shall be between 115 degrees F and 0 degrees F in cooling as standard from factory. Inverter style heat pumps.

1. Make: Trane, Lennox, Carrier, Daikin or approved equivalent heat pumps for split system. Air handler units and heat pumps shall be of same manufacturer.

Casing: Unit casing shall be constructed of 18-gauge zinc coated heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Units surface shall be tested 500 hours in salt spray test. Units shall have removable end panels, which allow access to all major components and controls.

Compliance: Units shall be UL listed certified.

Control: Control wiring shall be 24-volt control circuit, which includes fusing and control transformer. Units shall provide external location for mounting a fused disconnect device. Anti-recycle timers shall be provided. Defrost control electronic timed initiated, temperature terminated defrost system with choice of 50-, 70- or 90-minute cycle. Timed override limits defrost cycle to 10 minutes. Low ambient head pressure control shall be furnished to permit operation to 0 degrees F.

Heat Pumps: Heat pump units shall be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring.

Specifications, System: Units shall have a single refrigeration circuit. Refrigeration circuits shall have an integral subcooling circuit. A refrigeration filter drier, expansion valve and check valves shall be provided. The units shall have both a liquid line and suction gas line service valve with gauge port. Units shall have one direct drive hermetic reciprocating compressor with centrifugal oil pump providing positive lubrication to moving parts. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of nameplate voltage. Crankcase heater, temperature and current-sensitive motor overloads shall be included for maximum protection. Shall have internal spring isolation and sound muffling to minimize vibration transmission and noise. External high- and low-pressure cutout devices shall be provided. Evaporator defrost control provided in indoor blower coil unit shall prevent compressor slugging by temporarily interrupting compressor operation when low evaporator coil temperatures are encountered. Condenser coils shall be internally finned or smooth bore 3/8-in. copper tubes mechanically bonded to configured

aluminum plate fin as standard. Coil shall be factory pressure and leak tested to 425 psig air pressure. Furnish metal grilles with PVC coating for coil protection. Condenser fan and motor shall be direct-drive, statically and dynamically balanced 26- or 28-in. propeller fan with aluminum blades and electro-coated steel hubs shall be used in draw-through vertical discharge position. Permanently lubricated, totally enclosed construction type motor shall be provided and shall have built in current and thermal overload protection. Motor shall be ball bearing type. Piping and wiring diagrams shall be furnished with shop drawings. Entire system shall be piped and tested for leaks, control wiring shall be by the contractor. Entire system shall be made fully operational. Furnish an additional non-prorated 4-year warranty for the refrigerant compressors in addition to the first-year warranty.

Specification, System Control: All control systems must be fully compatible with the University temperature control central system (currently CSI). No proprietary controls, controller or software is to be substituted or used.

Circulating Pumps, base-mounted, end suction

Standards: Pumps shall be of bronze-fitted construction 175 psi working pressure, with cast iron casing, bronze impeller, bronze shaft sleeves and mechanical shaft seals, John Crane or equal. Shafts shall be stainless steel or polished carbon steel. Pump bearings shall be ball or roller type. Pump and motor shall be mounted on a rigid heavy-duty structural steel or cast-iron sub-base with flexible coupling between motor and pump. Pump and coupling arrangement shall allow pump servicing without disturbing the piping, alignment or moving motor.

1. Model: Bell & Gossett Series 1510, vertical split case end suction or equivalent, Aurora, Peerless.

Casing: Pump casings shall be provided with air vent cock, drain plugs and gauge tapings. Provide and install a discharge pipe mounted pressure gauge for each pump common to the suction and discharge. Gauges shall be valved so that either pressure can be read. Gauges shall be connected with type L copper tubing.

1. Upon completion of pump piping, adjust pipe supports so that no pipe strain is transmitted to the pump. The pump and motor assembly shall be aligned and then grouted in place.

Motor: Pump motor shall be standard of drip-proof design, ball bearing. Motor size, voltage and RPM shall be as scheduled. Pump selections shall be such as not to overload the motor regardless of pump head. Motor rating shall not include service factor. Provide across-the-line combination magnetic starter with hand-off-automatic switch in cover.

Mounting: Pumps shall be mounted on isolation bases as specified per project.

23 82 00 CONVENTION HEATING AND COOLING UNITS

Convectors

Make: Elements for steam convectors shall be Dunham Bush in make.

Converter, hot water

Make: Bell & Gossett type SU or equivalent Taco, or Armstrong steam to hot water converter.

Specifications: Converter shall be shell and tube design with removable U-tube bundle and designed for steam in the shell and water in the tubes. Shell shall be constructed of steel with steel tube sheets and tube supports and removable steel or cast iron head. Tubes shall be ¾ in. o.d. copper. The entire unit shall be rated for a working pressure of 150 psig. Converter shall be fitted with support saddles.

Fan Coil Units

Make: Floor/wall mounted units shall be equal to Trane type.

Casing: The basic unit casing shall be constructed of 18-gauge galvanized steel reinforced for rigidity and internally insulated in its entirety with a minimum of ½-in., 2-lb. density glass fiber thermal and acoustic insulation. Stamped discharge and intake openings shall be provided on exposed units unless indicated otherwise. Piping connections shall be arranged for a 2-pipe dual temperature system.

Coils: Cooling or combination cooling/heating coils shall be constructed of 5/8-in. O.D. seamless copper tubes with plate type aluminum fins with continuous fin collars mechanically bonded to the tubes. All coils shall be suitable for 200 psig maximum working pressure and factory tested with 300-psig air pressure. Provide a manual air vent on the coils.

Control: For 2-pipe heating/cooling system, control shall be by a factory furnished and installed 3-way electric control valve with automatic changeover. Unit shall be provided with thermostat with Hi-Med-Low-Off fan switch. Fan shall run continuously and the thermostat shall cycle the control valve to maintain setting. For a 4-pipe heating/cooling system, control shall be by factory furnished and installed electric control valves with manual changeover. Unit shall be provided with a wall-mounted thermostat with Hi-Med-Low-Off fan switch and Heat-Cool selector switch. Fan shall run continuously and the thermostat shall cycle the control valves to maintain setting. System could be converted to University controls (CSI) upon approval by Northwest Facility Services.

Drain Pans: Such shall be constructed of 20-gauge galvanized steel and externally insulated with closed cell foam insulation. Provide secondary drain pan(s) under all valve assemblies on all units. Provide a drain line to remove condensate to a condensate riser.

Fans: Unit fans shall be centrifugal, double width, double inlet, forward curved type with dynamically balanced fan wheels. Fan housings shall be constructed of galvanized steel with streamlined air inlets.

Filters: Throwaway filters of 1-in. thickness shall be provided on the inlet to all units. One new set of filters shall be installed at the time of Northwest's acceptance and one additional set of spare filters shall be delivered to the Northwest's representative. Fan coils shall not be operated without the filters in place.

Motor: Each unit shall be furnished with a 115/60/1 permanent split capacitor 3-speed tap wound motor with integral thermal overload protection and automatic reset, having a minimum power factor of 0.83.

Valves: Install shut-off valves and balancing valves on the coil supply and return piping.

Fin Tube Radiation

Enclosures: Such shall be of sloping top type, minimum 16-gauge steel with stamped discharge grille, and shall include corners, end caps or wall sleeves, as required. Access doors shall be provided in the enclosures at all valve locations. Enclosures shall have a baked enamel finish, color as selected by the Architect.

Heating Elements: Such shall be two-row, 1¼-inch, copper-aluminum fins per foot, with a capacity as specified at 65 degrees F entering air temperature and 200 degrees F average water temperature.

1. Supports: Element supports shall have nylon or ball bearing cradle guides to allow for expansion.

Make: Trane or equivalent Sterling, Dunham-Bush or Vulcan, complete with heating element, supports, enclosures and other accessories required for a complete installation.

Heating Coils, steam

Standards: Daikin Type 8JA, or equivalent Aerofin, Bohn, or Trane non-freeze distributing type steam heating coils. Pipe connections for steam supply and condensate return shall all be on the same end of the coil. Piping connections shall be as detailed on the plans and shall include steam traps, shutoff and control valves.

Steam coils shall have extra heavy aluminum fins mechanically bonded to 1-in. o.d. outer copper tubes. Casings shall be of zinc coated steel, rigidly die formed. Coils shall be designed and tested for 150-psi working pressure. Coil dimensions shall be as required to fit space as shown and detailed on plans. Coil fin spacing shall not exceed 12 fins per inch.

Capacities, configurations, rows, face area and air pressure drops shall be as scheduled on the Drawings.

Heating and Cooling Coils, water

Standards: Daikin Type 5W or equivalent Aerofin, Bohn, York or Trane, with continuous and staggered tube circuits from inlet header to outlet header. Headers and pipe connections for supply and return shall be on the same end of the coil. Coils shall have copper fins mechanically bonded to 5/8-in. o.d. copper tubes and completely coated with tin-lead alloy.

Casing: Casings shall be 16-gauge zinc coated steel, die formed and flanged. Flanged casings shall have boltholes for mounting. Casings and tube supports shall allow for expansion of tubes. Coils shall be designed and tested for 200-psi working pressure.

Installation: Coil installation shall include supports, condensate drip pans, intermediate drain gutters and downspouts for multiple bank coil arrangements, air vents, drains, valves and accessories specified per project.

Spacing: Coil fin spacing shall not exceed 12 fins per inch.

Reheat Coils, hot water

Standards: Daikin Type 5B, or equivalent Aerofin, Bohn, or Trane hot water booster coils. Pipe connections for supply and return shall all be on the same end of the coil. Piping connections shall include shutoff and balancing valves.

Water coils shall have aluminum fins mechanically bonded to 5/8-in. o.d. copper tubes. Casings shall be of zinc coated steel, rigidly die formed. Coils shall be designed and tested for 200-psi working pressure. Coil fin spacing shall not exceed 12 fins per in.

Cabinet Unit Heaters

Standards: Unit shall be complete with coil, centrifugal fans, motor and filter all enclosed in a steel cabinet with baked enamel finish.

1. Make: Trane, Daikin, Dunham-Bush or Modine cabinet unit heater

Cabinets: Cabinets shall be minimum 18-gauge furniture steel, with baked enamel finish, with color as selected by Architect. Air inlet and outlet openings shall be substantially formed grilles. Cabinets for recessed units shall completely overlap all sides of the wall openings. Refer to the Drawings for recess depth required. All recessed units shall be mounted with the bottom 6-in. above finished floor line.

Elements: Heating elements shall be for hot water service, constructed of copper tubes and aluminum fins and suitable for 200 psig working pressure. Unit capacities shall be as indicated on the plans, based on 60 degrees F entering air temperature and 160 degrees F entering water temperature.

Motor: Fan motor shall be 120-volt, 1-phase, 60-cycle, multi-speed, permanent split capacitor type with external or internal overload protection. Furnish manual starter for each unit.

Unit Heaters, horizontal

Standards: Trane, Daikin, Dunham-Bush or Modine horizontal unit heaters complete with coil, motor, propeller fan and guard all encased in a substantial metal casing with directional air louvers and baked enamel finish. Louvers shall be double deflection type.

Elements: Heating elements shall be for hot water service, constructed of copper tubes and aluminum fins and suitable for 200 psig working pressure. Unit capacities shall be as indicated on the plans, based on 60 degrees entering air temperature and 160 degrees F entering water temperature.

Motor: Such shall be 120-volt, 1-phase, 60-cycle, single-speed type. Provide manual starter for each unit.

Unit Heaters, vertical

Make: Trane, Daikin, Dunham-Bush or Modine vertical unit heaters complete with coil, motor, and propeller fan all encased in a substantial metal casing with discharge louvers and baked enamel finish.

Elements: Heating elements shall be for service, constructed of copper tubes and aluminum fins and suitable for 200-psig working pressure. Unit capacities shall be based on 60°F entering air temperature and 160-degree entering water temperature or 2-lb. entering steam pressure.

Motors: Such shall be 120-volt, 1-phase, 60 cycle, single speed. Provide manual starter for each unit.

- END OF SECTION –

Division 25 – Integrated Automation

25 50 00 - Integrated Automation Facility Controls

25 55 00 INTEGRATED AUTOMATION CONTROL OF HVAC

(Note: Utilize Northwest Missouri State University Controls Specification for the above CSI division – See Appendix A.)

General

- Implement an Enterprise Facility Management and Control System (EFMCS) that consolidates HVAC, lighting, security, and energy management under a unified platform.
- Utilize Niagara4 Supervisor or latest stable Niagara version and BuildingLogix BDx System (BDx), integrating local Niagara systems via JACE hardware for seamless control.

Master System Integrator (MSI)

- The MSI shall establish a unified database and standardized software templates to ensure interoperability.
- Install, configure, and maintain all networked control systems in compliance with cybersecurity and IT standards.
- Conduct commissioning, ensuring connected systems are tested, optimized, and fully documented.

Open Integration Approach using Niagara Framework

- All building systems shall operate within the Niagara Framework, which supports BACnet, MODBUS, and LonTalk protocols.
- The MSI shall ensure uniform system communication and maintain a standardized graphical user interface across all control platforms.

Fault Diagnostic and Detection (FDD)

- MSI shall implement automated diagnostics to monitor equipment performance, sensor data, and historical trends for predictive maintenance. Engineer of Record may direct which FDD's are applicable and sequence to their operation. The BDx web agent will house and process the FDD's.
- The system must trigger alerts for anomalies and provide corrective recommendations before faults escalate.

Building Analytics and Energy Optimization

- Deploy advanced analytics for real-time monitoring and optimization of energy consumption through the BDx system.
- Utilize predictive algorithms to maximize efficiency, reduce waste, and improve building sustainability through user input of data.
- Integrate Energy Aggregation and Analytics within the Niagara Web Supervisor framework.

Consistent Graphical Representation

- Design consistent graphical interfaces across all connected systems to facilitate intuitive navigation and streamlined operation.
- Ensure uniform color schemes, trends, alarms, and dashboards for user-friendly monitoring.

Secure Facility Network with Virtual Lan Area Network (VLAN) Segmentation

- Segregate control networks using VLAN segmentation to enhance security and optimize data flow management.
- Installing vendor must ensure proper encryption and network isolation for building automation components.

Standardized Software Tagging using BRICK Schema

- Implement BRICK schema for structured and consistent data tagging, ensuring scalability and long-term maintainability.
- Installing controls vendor in conjuction MSI vendors must apply location-based tagging including building floors and compass directional markers in design criteria for projects
- Where applicable the Engineer of Record shall apply location-based tagging including building floors and compass directional markers in design criteria for projects.

Installation & Configuration of Niagara Web Supervisor

- The MSI shall install and configure Niagara Web Supervisor with an unlimited license, allowing centralized aggregation of all control systems.
- Maintain administrator-level access credentials for the university's operational teams.

IT Security Measures & Cybersecurity Compliance

- Engineers must enforce authentication protocols, SSL encryption, Active Directory integration, and compliance with university cybersecurity policies.
- Audit logs, role-based access, and intrusion prevention must be incorporated into the security framework.

Database Standardization & Graphics Development

- The MSI develops a standardized database for system-wide integration, ensuring consistency in naming conventions, tags, and data structures. Additionally, the MSI is responsible for creating uniform graphics, dashboards, and alarm interfaces, offering intuitive navigation and operational oversight.

Secure Web Access for Operators

- Operators access the integrated system via secure web access, using standard browsers such as Chrome, Firefox, and Edge. This web-based interface eliminates the need for proprieta
- y software installations, ensuring accessibility while maintaining system security.

Compliance with FCC, UL, and Cybersecurity Standards

- All integrated systems must adhere to FCC, UL, and cybersecurity standards, ensuring regulatory compliance and system reliability. This guarantees operational safety, electromagnetic compatibility, and adherence to cybersecurity best practices.

Cybersecurity Measures & Audit Logs

- Cybersecurity strategies include audit logging, security dashboards, and role-based access control to monitor system activities and mitigate security risks. These measures provide transparency, ensure accountability, and enable re
- l-time threat detection.
- The establishment of a virtual machine utilizing encryption remote devices provides extra layers of security and single sign on abilities.
- Utilization of encryption device (TosiBox) or university provided Virtual Private Network (VPN) will be the only methods allowed of remote connectivity.

System Commissioning & Testing

- The Commissioning Authority (CxA) in conjunction with the MSI vendor conducts thorough system commissioning and testing, verifying network configurations, integration accuracy, and hardware/software performance. This process ensures reliability before the system is handed over for operational use.

Warranty & Software Maintenance Agreement

- The system includes a one-year warranty on hardware and software, The MSI provides updates, troubleshooting assistance, and performance optimizations during the warranty period.

User Training & Operator Education

- The MSI provides 40 hours of training on system operation, covering software usage, alarm handling, scheduling, diagnostics, and system navigation. This ensures end-users are fully equipped to manage and optimize facility operations.

- END OF SECTION –

Division 26 – Electrical

26 05 00 - Common Work Results for Electrical

26 05 05 SELECTIVE DEMOLITION FOR ELECTRICAL

Electrical Demolition

No electrical panels or breakers shall be removed from campus without the permission of Northwest Facility Services.

26 05 10 GENERAL INFORMATION

- Set, align, and connect all motors and furnish lubrication, start-up, and test.
- All electrical panels shall include an accurate legend, which shall be typed and, at minimum, labeled to match drawings. The legend shall reflect changes in room numbers as directed by Northwest.
- Only copper conductors shall be used. Any substitution must be approved by Facility Services.
- All installations follow current National Electrical Code (NEC).
- All covers for electrical devices, disconnects, and junction boxes shall be marked with nylon tags (black lettering on white or clear background) denoting panel/breakers.
- All branch circuits/feeder wires shall be colored per phase:
  - 208/120V – black, red, blue, white
  - 480/277V – brown, orange, yellow, gray

All terminations and joints shall be clearly marked with panel/breaker

Startup of Systems

General, actions before startup: Prior to start-up of electrical systems, check all components and devices, lubricate items appropriately, and tighten all screwed and bolted connections. Perform steps listed below.

1. Review manufacturer's instructions on the proper procedure for checking out each device and system and shall follow those instructions.
2. Adjust taps on each transformer for rated secondary voltage.
3. Check and record building service entrance voltage, and report to the Architect/Engineer and Northwest Design and Construction any under-voltage or over-voltage condition. Check and report grounding conditions and grounding resistance. Check each system for proper phasing, reporting results to the Architect/Engineer and Northwest Design and Construction.

4. Inspect and clean all contacts in accordance with manufacturer's instructions, and inspect and adjust contact action and alignment.
5. Balance all single-phase loads at each panelboard, redistributing branch circuit connections until balance is achieved.
6. Replace all burned-out lamps.
7. After all systems have been inspected and adjusted, confirm all operating features required by the Specifications. Record and report malfunctions to the Architect/Engineer and Northwest Design and Construction and then make adjustments. Operate all systems under full load.
8. Re-check alignment of shafts and adjust.
9. Submit to the Architect/Engineer and Northwest Project Management a list of all motors on the project, setting forth for each: location, function, horsepower, voltage, phases, Hertz, full load amperes, service factor, overload relay manufacturer, thermal unit number manufacturer and model.

Ground System

All devices should be properly grounded according to manufacturer specs and NEC standards.

Motors

Perform steps listed below.

1. Make phasing and rotation checks.
2. Label all motor load wires with proper phasing indication.

Panel boards

Perform the steps listed below.

1. Check load balance between phases, and reconnect feed cables if necessary.
2. Check main breakers for proper rating and operation.
3. Verify conductor is proper size for load with proper fusing.
4. Label all incoming phases appropriately for identification.

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

Standards

All grounding shall be in accordance with NEC Standards. Continuity of equipment ground shall be maintained throughout the system.

Conductor, connection of

Between Conductors: Connections between grounding conductors shall be the exothermic weld or compression type.

To Building: Grounding conductor connections to building steel shall be exothermic weld type, Cadweld Co. or equal.

To Equipment: Grounding conductor connections to equipment shall be made with compression type lugs, Burndy Co. or equal.

To Piping and Conduit: Grounding conductor connections to conduit and piping shall be made with fittings UL listed for this purpose.

Flexible Metal Conduit, grounding of

All circuits run in flexible metal conduit shall include a ground wire sized as shown on Drawings and as required by NEC Standards.

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

Conduit Isolation

Conduit or other electrical connections to isolated electrical equipment shall be made with lengths of flexible conduit or armored cable. Provide sufficient length to keep stress off of connections.

Penetrations, utility cabinet and outlet box

Variable frequency drives, dimmers, and other wall-mounted electrical equipment shall utilize neoprene wall isolators to dampen vibration transmission to supporting structure.

26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

Painting and Identification

Painting: Touch up or refinish minor damage to items of equipment supplied with manufacturer's standard finish.

Identification by Nameplate: An engraved nameplate shall be provided on each individually mounted electrical equipment and device. The nameplate shall indicate the name of the load as designated on the drawings and specifications, and its style shall be white with black letters.

- END OF SECTION –

26 20 00 - Low-Voltage Electrical Distribution

26 24 00 SWITCHBOARDS AND PANELBOARDS

Load Centers

Standards: Load centers shall be of Square D – QOB/QO and HomeLine QOB.

Breakers: Multiple circuit breakers shall be of the common trip type. Incorporate full-size breakers only (no twin and no half size). Plug-in-type breakers may be used. **Prepare and install typewritten directories in each load center indicating the load controlled by each breaker; there shall be no exceptions to this standard. Provide a second typed copy for Northwest Facility Services.**

Panel boards

Standards: Panel boards shall be of Square D – QOB/QO and HomeLine make or approved equal. Panel boards shall meet UL standards, shall bear UL labels, and shall meet NEMA Standards. A panel board installed as service entrance equipment shall be permanently marked to identify it as suitable for use as service entrance equipment.

Panel boards, distribution (fusible switch type)

Standards: Distribution panel boards shall be of Square D, GE, Westinghouse make. Panel board shall be UL listed.

Branch Circuits: Branch circuits shall have fully interchangeable switches. Switches shall be quick-make, quick-break, and fusible. Fuse clips or provision for bolt-in fuses shall be appropriate for the fuses specified. Switches shall have interlocked covers and a cardholder for circuit identification.

Current carrying conductors to be labeled.

Bus Bars: Such shall be copper or copper-clad.

Cabinets: Cabinets shall be constructed of galvanized sheet steel on a reinforced galvanized sheet steel frame with bus bars braced to withstand the effects of short-circuit current indicated by the main device. Cabinets shall have a rust-proof prime coat and a finish coat of paint.

Nameplate: Each device shall have an engraved nameplate, white with black letters.

Terminal Lugs: Shall be UL approved for AL/CU termination.

Panel boards, lighting

Standards: Lighting panel boards shall be of appropriate voltage for the structure in which they are being installed. Acceptable manufacturers for such are Square D – QOB/QO and HomeLine.

Breakers: Breakers shall be thermal-magnetic type, quick-make, quick-break, ambient compensated to carry rated current in open-air ambient temperatures from 10 to 50 degrees C, single unit construction. Two and three pole breakers, where called for, shall be a single unit common trip.

1. Ground fault and arc fault circuit breakers shall incorporate overload, short circuit, and Underwriters Laboratory Class A (5 milliamp sensitivity) ground fault circuit interruption. Amperage rating shall be appropriate for associated loads.
2. For 240-volt applications or less Northwest prefers the use of stab-in breakers. The designer must confirm stab-in style breaker is appropriate for the application and the specified breakers meet all manufacturer standards, code requirements, and industry standards. The use of bolt-in breakers for 240-volt applications or less will need prior approval from Northwest.
3. Bolt-in Breakers are required for any application above 240-volts or where stab-in breakers do not meet the application requirements.

Cabinets: Such shall be constructed of one-piece code gauge galvanized steel with mounting studs, and shall have wiring gutters of ample size and knockouts for conduit connections as required. Bus bars shall be copper or copper-clad. Front shall be of one piece of code gauge furniture steel with adjustable fasteners. Two section panel boards shall have one-piece front. Panels shall have recessed doors fitted with concealed hinges, flush catch lock with two keys. Cabinets shall have a rustproof prime coat and a finish coat of paint. Back of doors shall be fitted with a plastic covered typewritten schedule identifying all branch circuits. A duplicate copy of each circuit directory shall be delivered to Northwest Facility Services.

Terminal Lugs: Such shall be UL approved for AL/CU termination.

26 27 26 WIRING DEVICES

Wall Switches

Manufacturers:

1. Hubbell.
2. Leviton.
3. Arrow Hart.

Description: NEMA WD 1, heavy-duty AC only general-use snap switch. If using stranded conductor provide device suitable for that use.

Color: Device Body-White

Ratings:

1. Dielectric Withstand Voltage: 1500V minimum.
2. Overload: Minimum 4.8 times rated current for 100 cycles.
3. Temperature Rise: 30 Deg. C maximum at rated current.
4. Endurance: 50,000 cycles minimum, resistive, inductive, tungsten filament lamp load.
5. Voltage: 120-277 volts, AC.
6. Current: 20 amperes.

Certification: UL Listed to UL Standard 20; Federal Specification WS896E listed; NEMA WD-1.

Provide 3-way or 4-way switches as indicated on the drawings.

Keyed Switches

Manufacturers:

1. Hubbell.
2. Arrow Hart.
3. Leviton.

Description: Momentary key operated switches, heavy duty AC only, general use. Provide switch suitable for mounting location indicated.

Color: Match existing device color.

Ratings:

1. Voltage: 120 -277 volts, AC
2. Current: 20 amperes.

Provide 3-way or 4-way switches as indicated on the drawings.

Wall Switch Occupancy Sensor Type

Description: Wall unit, suitable for mounting to a standard outlet box, employing dual ultrasonic and passive infrared technology, suitable for 120/277 volt operation, suitable for use with LED fixtures, possessing immunity to EMI an RFI, detects movement over 2000 square foot with a 180 degree line-of-sight coverage, adjustments for time delay and sensitivity; and containing an “auto-off-on” switch.

Color: White. Non-breakable

Duplex Receptacles

Manufacturers:

1. Hubbell.
2. Leviton.
3. Arrow Hart.

Description: NEMA WD 1; industrial specification grade general-use receptable. If using stranded conductor provide device suitable for that use.

Color: General Purpose – white.

Ratings:

1. NEMA Type 5-20R.
2. Dielectric Withstand Voltage: 2000V minimum.
3. Overload: Minimum 4.8 times rated current for 100 cycles.
4. Temperature Rise: 30 Deg. C maximum at rated current after 50 cycles of overload at 150% of rated current with direct current.
5. Voltage: 250 volts, AC.
6. Current Interrupting: Certified for current interrupting at full rated current, 20 amperes.

GFCI Receptacle

Description: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

Color: white.

Ratings:

1. Dielectric Withstand Voltage: 2000V minimum.
2. Overload: Minimum 4.8 times rated current for 100 cycles.
3. Temperature Rise: 30 Deg. C maximum at rated current after 50 cycles of overload at 150% of rated current direct current.
4. Voltage: 250 volts, AC
5. Current Interrupting: Certified for current interrupting at full rated current, 20 amperes.

Combination AC/USB duplex receptacle

Color: White.

Provide with (2) USB charging ports.

Ratings:

1. Dielectric Withstand Voltage: 2000V minimum.
2. Overload: Minimum 4.8 times rated current for 100 cycles.
3. Temperature Rise: 30 Deg. C maximum at rated current after 50 cycles of overload at 150% of rated current with direct current.
4. Voltage: 250 volts, AC.
5. Current Interrupting: Certified interrupting at full rated current, 20 amperes.
6. USB ports:
   a. 5V.
   b. USB 2.0 and 3.0 compatible.
   c. 3.1A charging capability.

Decorative Cover Plate

Manufactures:

1. Cooper Wiring Devices.
2. Leviton.
3. Arrow Hart.

Description: White. Non-breakable.

Jumbo Cover Plate

Manufactures:

1. Cooper Wiring Devices.
2. Leviton.
3. P&S.

Description: White. Non-breakable.

26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

Disconnect Switches

Standards: All disconnect switches shall be NEMA Type HD (Heavy Duty). Side-operation switches may be utilized except where space is limited; in which case front-operation switches shall be utilized.

1. Make: Disconnect switches shall be G.E., Westinghouse, Square D or approved equal by.

2. Switches controlling or disconnecting motor loads shall be horsepower rated and approved for motor control service. Any exceptions shall be approved by Northwest Facility Services.

Compliance: Furnish and install all disconnect switches required for full code compliance; install only where disconnect switches are already furnished with equipment specified in other divisions.

Enclosures: NEMA Type 1 general-purpose enclosures shall be used in dry indoor locations. NEMA Type 3R raintight enclosures or Type 4 watertight enclosures shall be used in all outdoor locations and at other locations if specifically indicated on drawings or in specifications.

Fuses: Disconnect switches shall be non-fused unless otherwise indicated or required by code.

Location: The controller's disconnect switch shall be installed per NEC requirements.

Tagged on enclosure to feed location and breaker.

26 29 13 ENCLOSED CONTROLLERS

Magnetic Starter and Disconnect Switch Combination

Combination disconnect switch and magnetic starter shall be Square D Class 8538 or approved equal by GE, Westinghouse, or Siemens.

Standards: Combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes and horsepower ratings. Disconnect switch combination starters shall consist of a visible blade disconnect switch and a motor starter. NEMA Type 1 general purpose enclosures shall be used in dry indoor locations. NEMA Type 3R rain tight enclosures shall be used in all outdoor locations and at other locations if specifically indicated on Drawings or in Specifications. Combination starter/disconnect switch shall be installed per NEC requirements.

1. All starters used in combination starters shall be across-the-line magnetic type, manufactured in accordance with the latest published NEMA standard sizes, and horsepower ratings. These starters shall be furnished with three melting alloy or non-automatic reset bimetallic type thermal overload relays. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if any thermal unit is removed. Thermal units shall be selected to match the full load amperes of the motor controlled by the starter.
2. All combination starters for 480-volt motors shall have control transformer and secondary fuse for 120-volt control operation.
3. All combination magnetic starters shall be equipped with a cover-mounted red pilot light and either a three-position Hand-Off-Auto switch or Stop-Start pushbuttons as indicated or as required for the specified operation.

Motor Starters, magnetic

Standards: Magnetic starters shall be equipped with a cover-mounted "red" pilot light and either a three-position Hand-Off-Auto switch or Start-Stop pushbuttons as indicated or required for the specified operation. Motor starters shall be across-the-line magnetic type rated in accordance with NEMA Standards, sizes and horsepower ratings. Starters shall be mounted in NEMA 1 general-purpose enclosures unless otherwise approved. Overload relays shall be the melting alloy or non-automatic reset bimetallic type with a replaceable control module.

1. Magnetic motor starters shall be Square D Class 8536 make or approved equal by GE, Westinghouse, or Siemens.
2. NEMA Size 0 through 5 starters shall be suitable for the addition of at least four external electrical interlocks of any arrangement normally open or normally closed. NEMA size 6 through 8 starters shall be suitable for the addition of up to three external electrical interlocks of any arrangement normally open or normally closed.
3. All starters on 480-volt motors shall have control transformer and secondary fuse for 120-volt control operation.

Coils: All coils shall be easily accessible for replacement without removing the starter from the panel.

Contacts: Across-the-line magnetic starters through NEMA size five shall be equipped with double break silver alloy contacts. Single break contacts shall be supplied on size six and larger. All contacts shall be replaceable without removing power wiring or removing starter from panel.

Thermal Units: Such shall be of one-piece construction and interchangeable. The starter shall be inoperative if any thermal unit is removed. Thermal units shall be selected from tables provided by starter manufacturer and selected to match the full load amperes of the motor controlled by the starter.

Motor Starters, manual (with thermal overload)

Standards: Manual starters shall consist of a manually operated toggle switch equipped with melting alloy or non-automatic reset bimetallic type thermal overload relay. Thermal unit shall be of one-piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Thermal overload shall be selected from tables provided by starter manufacturer and shall be selected to match the full load amperes of the motor controlled by the starter.

1. Make: Manual motor starters shall be Square D Class 2510 or approved equal by GE, Westinghouse, or Siemens.

- END OF SECTION –

26 30 00 - Facility Electrical Power Generating and Storing Equipment

26 30 10 GENERAL INFORMATION

- Furnish all electric motors, switches, relays, pushbuttons and other devices necessary for the proper operation and control of equipment furnished under this Division.

- Install/commission said devices required.

26 35 00 POWER FILTERS AND CONDITIONERS

Surge Suppressors

Whenever equipment sensitive to electrical surge is to be installed or is a part of any given project a surge suppressor shall be utilized.

-END OF SECTION-

26 40 00 - Electrical Protection

26 41 10 GENERAL INFORMATION

- Existing lightning protection shall be maintained during renovations.
- Major renovations and new structures shall have lightning protection installed unless otherwise directed by Northwest Facility Services.

- END OF SECTION –

26 50 00 - Lighting

26 50 10 General Information

- Comply with all requirements specified within this section – including lighting fixture datasheet and lighting fixture schedules
- Metal Parts: Shall be free from burrs and sharp corners and edges.
- Sheets Metal Components: Shall be steel, except as indicated. Components are formed and supported to prevent warping and sagging.
- Doors, Frames, and Other Internal Access: Shall be smooth operating and free from light leakage under operating conditions. Arrange to permit re-lamping without the use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in the operating position.
- Lenses, Diffusers, Covers, and Globes: Shall be 100 percent virgin acrylic plastic or water white, annealed crystal glass, with the exceptions listed below.
    1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    2. Lens thickness: Minimum of 0.125-in.
- IES (Illuminating Engineering Society) current edition recommendations shall be used for baseline Light Illumination levels. Any lighting level designs under the minimum recommended IES Illumination is not permissible unless otherwise approved by Northwest.
- Any use of pendant or track lighting is to be minimal and must be approved by Northwest Facility Services prior to installation.
- All lighting shall be LED unless otherwise approved by Northwest Facility Services.
- Color temperature of lighting shall be as follows unless otherwise approved by Northwest Facility Services:
    - 4000K : Classrooms, Offices, Bathrooms, Lounges
    - 5000K: Hallways, Stairwells, Outdoors

26 51 00 Interior Luminaires

Fixtures, general

Provide light fixtures as scheduled. This shall include all lamps, material, and labor required to hang fixtures, clean them, and make them completely ready for use. All light fixtures shall be UL listed or ETL listed.

Provide trim to fit each ceiling condition actually encountered. Verify actual ceiling construction prior to ordering fixtures.

Coordinate the electrical work with the ceiling construction so that each light fixture is centered in or between tiles and/or as shown on a reflected ceiling plan.

Fixture design shall take into account the fixture application.

Wipe clean all fixtures, glassware, and lamps at start-up.

The use of can lights in gypsum board ceilings is to be avoided. Such use must be approved by Northwest Facility Services.

Color temperature of fixtures shall be in accordance with Section 265010.

Fixtures, adjusting and cleaning

Adjusting: Adjust aimable fixtures to provide required light intensities.

Cleaning: Clean fixtures upon completion of installation. Use methods and materials, as recommended by the manufacturer.

Fixtures, LED

Compliance: Shall conform to UL 8750, “Light Emitting Diode Equipment for Use in Lighting Products.” Fixtures shall be UL listed or ETL listed.

Driver: If fixture is to be located in a hazardous area, driver shall be “Type HL”.

Fixture selection shall be approved by Northwest Facility Services.

Fixtures, installation of

Fixture installation shall comply with the most current IBC, which includes, but is not limited to, the following:

1. All lighting fixtures shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.
2. When "intermediate" systems are used, No. 12-gauge hangers shall be attached to the grid members within 3-in. of each corner of each fixture. Tandem fixture may utilize common wires.
3. Where "heavy duty" systems are used, supplemental hangers are not required if a 48-in. modular hanger pattern is followed. When cross runners are used without supplemental hangers to support lighting fixtures, these cross runners must provide the same carrying capacity as the main runner.
4. Lighting fixtures weighing less than 56 pounds shall have, in addition to the requirements outlined above, two no. 12-gauge hangers connected from the fixture housing to the structure above. These wires may be slack.
5. Lighting fixtures weighing 56 pounds or more shall be supported directly from the structure above by approved hangers.

Lamping: Lamp units according to manufacturer’s instructions.

Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions.

Support for Recessed and Semi-recessed Fixtures: Installed units may be supported from ceiling support system. Install ceiling system support rods or wires at a maximum of four rods or wires per fixture located not more than 6-in. from fixture corners. Install support clips for recessed fixtures, securely fastened to ceiling grid members at or near the corners of each fixture.

1. Fixtures larger than ceiling grid: Install a minimum of four rods or wires for each fixture at corner of ceiling grid where fixture is located.
2. Fixtures of sizes less than ceiling grid: Center in the acoustical panel; support fixtures independently with at least two ¾-in. metal channels that span and are secured to ceiling tees.

Support for Suspended Fixtures: Brace pendants and rods that are 4-ft. long or longer to limit swinging. Support stem-mounted, single-unit suspended fluorescent fixtures with twin-stem hangers. For continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of chassis – including one at each end.

Fixtures for Hazardous Locations

Conform to UL 844, "Electric Lighting Fixtures for Use in Hazardous (classified) Locations," or provide units that have Factory Mutual Engineering and Research Corporation certification for the indicated class and division of hazard. For LED fixtures located in a hazardous area, driver shall be "Type HL".

Lighting in Restrooms

Bathrooms shall be well lit. Lighting shall be installed so as to match water closet partitions and compliment lavatory and mirror placements.

Track Lighting

Conform to UL 1574, "Track Lighting Systems." Provide components, including track, fittings, and fixtures from the same manufacturer – and as recommended by the manufacturer for the intended purpose.

Stage and Studio Lighting Equipment: Conform to UL 1573, "Stage and Studio Lighting Units."

26 51 13 INCANDESCENT INTERIOR LIGHTING

Lamps

Lamps shall be Sylvania or equal by General Electric or Phillips Lighting. Lamp color temperature shall be in accordance with section 265010 unless otherwise specified or approved by Northwest Facility Services.

26 52 00 SAFETY LIGHTING

General

In new construction and complete renovations, emergency lighting may be provided by means of an inverter capable of providing emergency power for all circuits listed as such, and is subject to approval by Northwest Facility Services. Emergency lights shall be installed to meet all IBC, NEC, and NFPA code requirements.

In partial renovations, emergency lighting shall consist of wall-mounted units as specified in "Emergency Lighting Units" within this section.

Emergency Lighting Units

Emergency lighting units shall be Lithonia EU2L M12 unless otherwise approved by Northwest Facility Services.

Exit Signs

Exit signs shall be LED, have emergency lights mounted on either side, and have a battery backup capable of providing 90 minutes of emergency lighting in the event of a power disruption. Final fixture selection shall be approved by Northwest Facility Services.

Face: Stencil face with red letters as specified.

Directional Arrows: Universal type for field adjustment.

Mounting: Universal for field selection. Exit signs shall be wall-mounted whenever possible. Signs shall be mounted so as not to conflict with door swings and at a minimum clear height of 7-ft.v

26 56 00 EXTERIOR LIGHTING

Fixture Components, general

Doors, Frames, and other Internal Access Provisions: Shall be smooth operating and free from light leakage under operating conditions. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in the operating position. Provide for door removal for cleaning or replacing lens. Arrange for door opening to disconnect ballast.

Housings: Shall be rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed fixtures.

Lenses and Refractors: Shall apply to materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor mounting in fixture doors.

Metal Parts: Shall be free from burrs and sharp edges and corners.

Photoelectric Relay: Refer to UL 773, “Plug-in, Locking Type Photocontrols for Use with Area Lighting.” Shall be NEMA 3 rated and mounted in fixture housing.

1. Contact Relays: Shall be single-throw, arranged to fail in the “on” position and factor set to turn light unit on at 1.5 to 3 foot-candles and off at 4.5 to 10 foot-candles with a 15-second minimum time delay.
2. Relay Mounting: Shall be in fixture housing.

Plastic Parts: Shall be resistant to yellowing and other changes due to aging and exposure to heat and UV radiation.

Color Temperature: Color temperature of fixtures shall be in accordance with Section 265010 unless otherwise specified or approved by Northwest Facility Services.

Fixtures, LED

Fixtures: Conform to UL 8750, “Light Emitting Diode Equipment for Use in Lighting Products.” Fixtures shall be UL listed or ETL listed. If fixture is to be located in a hazardous area, driver shall be “Type HL”.

Street and Parking Lot fixtures shall be Hubbel Airo LED Series (ASL-A-24L-5K-210-4-U-BL-7PR) or Northwest Facility Services approved equal.

Sidewalk and Pedestrian Light fixtures shall be Providence MicroCore – Medium Housing PROV (PROV-T5-32LED-5K-700-BL-DF-CLR-STND) or Northwest Facility Services approved equal.

Bollard light fixtures shall be Providence Bollard (PROB-Y5-2050-BLS-RD) or Northwest Facility Services approved equal.

Exterior Building Lights

All exterior lighting shall be photocell-controlled with manual override. No time clock system shall be used. During renovations, all existing exterior building lights shall stay in operation throughout the project.

Bases of Structures

Bases shall have a concrete apron on grade around them of 1 ft. (minimum) to allow for proper maintenance of grounds. Aprons shall be provided for lighting poles, air conditioning pads, and other such installations.

Lighting Poles, storage and handling of

General: Store poles on decay-resistant, treated skids at least 1 ft. above grade and vegetation. Support pole to prevent distortion, and arrange to provide free air circulation.

Adhere to the following directions in accordance with pole type:

1. Metal Poles: Retain factory-applied pole wrappings until just before pole installation. For poles with nonmetallic finishes, handle with web fabric strips.

Fixtures Support Components for Outdoor Lighting (Street & Parking Lot)

Mountings, Fastenings, and Appurtenances: Shall be corrosion-resistant components that are compatible with poles and fixtures and that will not cause galvanic action at contact points. Provide mountings that will correctly position the luminaire in order to provide the indicated light distribution.

1. Arm, Bracket, and Tenon Mount Materials: Such shall match poles.

Pole: Shall be RTA Series by Hubbell Outdoor Lighting, or Facility Services approved equal, 30’ aluminum pole, single or double arm, black paint finish.

Pole Shaft Types: Round tapered.

Fixtures Support Components for Outdoor Lighting (Sidewalk and Pedestrian)

Pole: Shall be Architectural Area Lighting DB5, 12-ft. round, straight, black color pole. Anchoring means utilizes 3 bolts with 8.75-inch bolt circle.

Astronomic Time Switches

Astronomic time switches shall be Intermatic ET2815C unless otherwise approved by Northwest Facility Services.

-END OF SECTION-

Division 27 - Communications

27 00 00 - Communications

27 00 10 GENERAL INFORMATION

- Communication rooms should be no less than 4'd x 8'w (inside dimensions) with ventilation; switched lighting and two 20A dedicated filtered power lines (red in color). Include one 20A power circuit with quadplex outlet.
- Communication room must be separate from power room unless otherwise approved by Northwest Facility Services.
- Communication room shall be separate from custodial closets.
- Communication room must be centrally located or distributed through building so that no data run will exceed 90 meters. Communication room must be provided with a stand-alone ground. This ground must be isolated from any other ground connector in the facility with a point of connection close to the data rack.
- Designer shall include one 19"x84" communications/data equipment rack with support equipment in design estimates. Telecom equipment (switch gear, routers, bridges, etc.) will be provided by the University but included in project estimates. Installation will be by owner.
- Designer should include cost estimate for UPS "uninterrupted power supply" of adequate size to provide 120V at 20amp service for 30 minutes. The UPS will be equipped with data link for coordinator to devices with intelligent shutdown capability. Any exception must be approved by Northwest Facility Services.
- Cable access between floors to communication room should be through 4" conduits (adequate to support current and future needs). Conduits should be located between back wall and rack location.
- Cable trays (see 16120) shall be used for cable access throughout any one floor of a structure. Any exception must be approved by Northwest Facility Services.
- Whenever possible data rooms in any one structure should be in a stack. Exceptions must be approved by Northwest Facility Services.
- Warranty – All cabling shall be installed to meet applicable TIA/EIA standards.
- Data rooms should be designed so that the temperature within the room does not exceed 25 degrees C regardless of the ambient temperature. This may require ventilation and cooling only, depending on location of room within the facility.

27 10 00 STRUCTURED CABLING

- All data lines and jacks shall be CAT5E or CAT6.
- All data cables shall be "home run" to the appropriate communication closet.
- All data cables shall be terminated at point of use. Termination in communication closets shall be done by the owner.
- All data cables shall be identified with machine printed labels with room number and cable number, (eg; 210-1, 210-2, 211-1, 211-2, etc.) at user and closet ends.

  All data faceplates shall be of a non-cracking type.

27 40 00 AUDIO-VIDEO COMMUNICATIONS

- If a sound system is specified by Northwest, it shall contain but not limited to:
  - 2 microphone inputs with 2 wireless microphones and receivers
  - 1 DVD audio input (stereo)
  - 1 computer audio input (stereo)
  - 1 mixer
  - 1 ventilated lockable cabinet for audio equipment with master sequenced power switch
  - 1 control box with presets for all inputs and outputs

- END OF SECTION –

Division 28 - Electronic Detection and Alarm

28 30 00 - Security Detection, Alarm, and Monitoring

28 30 00 GENERAL INFORMATION

- All fire detection shall be compatible with the existing Simplex system. Outdated devices shall be replaced or upgraded.
    1. Elevator controls shall be connected to interoperate with the campus Simplex System. Campus standards of operation shall be used.
- All fire alarm systems shall have voice messaging capabilities and will operate as part of the existing network.
- Residence hall rooms shall have sounder based smoke detectors installed and connected to the Simplex System. Programming in residence halls shall be done so that if only one device goes into alarm only the local alarm will sound and an alarm will sound in Campus Safety. A general building alarm will sound if a second device goes into alarm or if a device in a common area goes into alarm.
- Make all smoke detector heads tamper proof.

- END OF SECTION –

Division 31 – Earthwork

31 10 00 - Site Clearing

31 10 00 SITE CLEARING

Site Clearing

General: Any removal of trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction must be coordinated with Northwest Facility Services. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes grinding to an 8'' depth or digging out and off-site disposal of stumps, roots and debris.

Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 8-in. Satisfactory topsoil (soil) is of uniform quality without adding mixture of subsoil and is free of clay lumps, pebbles larger than 1'' in diameter, construction debris, and similar impurities. Topsoil should be relatively free from grass, weeds, roots and other objectionable material. Objectionable material can include gravel less than 1'' in diameter that occupies over 10% of the surface area.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
2. Where existing trees are indicated to remain, protect the critical rooting distance as defined within this section or as defined or modified by Northwest Facility Services, from all disturbance, including material storage, by placement of fencings specified in section 015600.
3. See Critical Rooting Distance within this section
4. Stockpile or store topsoil in areas directed, and, in so doing, adhere to the guidelines set forth by Northwest Facility Services. Construct stockpiles to provide free drainage of surface water. Cover stockpiles, if required, to prevent wind erosion.

Clearing: Clear site of trees, shrubs, and other vegetation, only as indicated.

1. Completely remove or grind stumps, roots, and other debris protruding through ground surface.
2. Fill depressions caused by clearing operations with satisfactory fill material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

Critical Rooting Distance

Critical Rooting Distance to Minimize Tree Damage: Root colonization area and limit of disruption are based upon tree diameter at 4.5 feet above the ground (DBH). Do not trespass or work closer to the tree trunk than the critical rooting distance indicated below. (Table values calculated using 920 sq. ft. of biologically healthy soil area per square ft. of tree cross-section.)

Diameter (in.) @ 54''	***Critical Rooting Distance (ft. of radius)***	***Diameter (in.)@ 54''***	***Critical Rooting Distance (ft. of radius)***
1	1.25	22	28
2	2.5	23	29
3	4	24	30
4	5	25	31
5	6	26	33
6	9	27	34
7	9	28	35
8	10	29	36
9	11	30	38
10	13	31	39
11	14	32	40
12	15	33	41
13	16	34	43
14	18	35	44
15	19	36	45
16	20	37	46
17	21	38	48
18	23	39	49
19	24	40	50
20	25	45	56
21	26	50	63

Waste Materials, disposal of

Remove waste materials and unsuitable topsoil from Northwest's property as approved by Northwest Facility Services.

1. Burning is not permitted on Northwest's property.

Soil Materials, storage of

- *See Soil Stockpiling entry within this Section for short-term storage of soil on-site*

Store excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Store without intermixing. Place, grade, and shape storage piles. Store on University property, as directed by Northwest Facility Services.

Soil Preparation and Protection

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations – this includes proper management of all stockpiled or stored materials. Contractor shall be responsible for sufficient clean-up to ensure adequate protection.

Protect subgrade and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

Erosion control measures shall be implemented per the Storm Water Prevention Plan (SWPP). The owner will be required to obtain the necessary land disturbance permits and provide the SWPP. These documents will be available to the contractor prior to construction.

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control drawings and requirements of authorities having jurisdiction.

2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.

4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

Any damage or inconvenience to Northwest operations caused by the excavation of soil or the erosion of stockpiles shall be corrected by the responsible contractor, as directed by Northwest Facility Services.

Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

1. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become compacted, eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace material to depth directed by Northwest Facility Services; reshape and re-compact at optimum moisture content to the required density.

Settling: Where settling occurs during the project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work; eliminate evidence of restoration to the greatest extent possible.

Soil Stockpiling

- *See Soil Materials, storage of entry within this Section for long-term storage of soil*

Removal of Soil from Campus: Any soil that is contaminated with an abundance of concrete, asphalt, or deleterious material shall be the responsibility of the contractor to remove. However, before any removal takes place, Northwest Facility Services shall decide what soil actually is defined as contaminated. All other soil and sub-soil shall be stored as determined by Northwest and as specifically designated by Northwest Facility Services.

Surplus Waste and Materials, Disposal of: Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off of Northwest's property.

Temporary Stockpiling: The contractor shall be responsible for control of weeds, keeping the area generally free of such, during the time of stockpiling.

- END OF SECTION –

31 23 00 - Excavation and Fill

31 23 00 EXCAVATION AND FILL

Excavation and Backfill, general

Perform all excavation necessary for installation of the work.

1. All material, both man-made or naturally occurring, which is required to be removed by the contract documents or is required to make the project functional, shall be disposed of by the Contractor at their own expense. Any item or material deemed beneficial or with salvage value to Northwest shall be stockpiled on Northwest property as directed by Northwest Facility Services.

2. Roads, alleys, streets and sidewalks damaged during this work shall be restored to the satisfaction of Northwest Facility Services.

3. Each trench shall be uniformly graded and the bottom shall be free of soft spots and stone. All water encountered in trenches must be drained away, or bailed and pumped out, and the trench kept dry for pipe laying. In no case shall sewers be used as drains for such water. Trenches close to walks or columns shall not be excavated without prior consultation with Northwest Facility Services. The excavation shall be shored or stepped back, if required by OSHA or local regulations.

4. Barricades: Barricades shall be erected around excavations. The contractor shall be held responsible for any damage that any parties may sustain in consequence of neglecting the necessary precautions in performance of the work.

5. Each storm water and sanitary sewer system shall be tested and accepted before backfilling.

6. Place backfill and fill materials in layers not more than 8-in. in loose depth for material compacted by heavy compaction equipment, and not more than 4 in. in loose depth for material compacted by hand-operated tampers. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

Backfill

Backfill excavations promptly, but not before completing the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Testing, inspecting, and approval of underground utilities.

4. Removal of trash and debris from excavation.

Backfill, utility trench

Place and compact bedding course on rock or other unyielding bearing surfaces. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 in. of footings. Place concrete to level of bottom of footings.

Provide 4-in.-thick concrete base slab support for piping or conduit less than 2 ft., 6 in. below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 in. of concrete before backfilling or placing roadway subbase.

Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 in., to a height of 12 in. over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

Fill voids with approved backfill materials as shoring and bracing, and sheeting are removed.

Place and compact final backfill of satisfactory soil material to final sub grade.

Coordinate backfilling with utilities testing.

Compaction

Place backfill and fill materials in layers not more than 8 in. in loose depth for material compacted by heavy compaction equipment, and not more than 4 in. in loose depth for material compacted by hand-operated tampers. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density:

1. Under structures, building slabs, steps, and pavements, compact the top 12 in. below sub grade and each layer of backfill or fill material at 95 percent maximum Standard Proctor dry density with a moisture content per geotechnical engineer recommendations and in accordance with ASTM D698.
2. Under walkways, compact the top 6 in. below sub grade and each layer of backfill or fill material at 95 percent maximum Standard Proctor dry density with a moisture content per geotechnical engineer recommendations and in accordance with ASTM D698.

3. Under lawn or unpaved areas, compact the top 6 in. below sub grade and each layer of backfill or fill material at 90 percent maximum Standard Proctor dry density with a moisture content per geotechnical engineer recommendations and in accordance with ASTM D698.

Excavation for Structures

Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 ft. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade or adjust to final grade using laser technology just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Mechanical or Electrical Appurtenances: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 ft. Do not disturb bottom of excavations intended for bearing surface.

Excavation, utility trench

Excavate trenches to indicated slopes, lines, depths, and invert elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 in. higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 in. each side of pipe or conduit or as indicated

Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

1. For pipes or conduit less than 6 in. in nominal diameter and flat-bottomed, multiple-duct conduit units, use laser leveling or hand-excavate trench bottoms and support pipe and conduit on an undisturbed sub grade.
2. For pipes and conduit 6 in. or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped backfill.
3. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 in. below invert elevation to receive bedding course.

Sub grade, approval of

When Northwest Facility Services and/or geotechnical engineer determines that unforeseen unsatisfactory soil is present at subgrade, continue excavation and replace with compacted backfill or fill material as directed.

1. Unforeseen additional excavation and replacement material will be paid according to the contract provisions for changes in work.

Reconstruct sub grade damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Northwest Facility Services.

When unsatisfactory soil is present verification of subgrade shall be obtained from a geotechnical engineer. Approved subgrade shall be in accordance with geotechnical engineer recommendations.

Excavation, unauthorized

Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to Northwest.

1. Fill unauthorized excavations under other construction as directed by Northwest Design and Construction.

Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by Northwest Facility Services.

Fill

Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.

1. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When sub grade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and re-compact to required density.

Place fill material in layers to required elevations for each location listed below.

1. Under grass, use 8-in. satisfactory topsoil. Under grass, over impervious surfaces use a minimum of 6-in. of satisfactory fill under 8-in. of satisfactory topsoil.
2. Under streets and parking lots, use sub base or base material.
3. Under walks use satisfactory excavated or borrow soil material.
4. Under building slabs, use low volume change material and granular leveling course.
5. Under footings and foundations, use engineered fill.

Moisture Control

Uniformly moisten or aerate sub grade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, satisfactory soil material that is too wet to compact to specified density. Stockpile or spread and dry removed wet satisfactory soil material.

Topsoil

Topsoil is defined as friable clay loam surface soil found in a depth of not less than 8-in. Satisfactory topsoil (soil) is of uniform quality without adding mixture of subsoil and is free of clay lumps, pebbles larger than 1'' in diameter, construction debris, and similar impurities. Topsoil should be relatively free from grass, weeds, roots and other objectionable material. Objectionable material can include gravel less than 1'' in diameter that occupies over 10% of the surface area.

Topsoil should not be handled when it is so wet that it will become densely compacted during placement. Sufficient depth must be placed to allow for future settlement.

See section 32 90 00 - Planting for additional topsoil and planting requirements.

31 23 19 DEWATERING

Soil Dewatering

Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared sub grades, and from flooding project site and surrounding area. Protect sub grades and foundation soils from softening and damage by rain or water accumulation.

- END OF SECTION –

31 30 00 - Earthwork Methods

31 31 00 SOIL TREATMENT

Termite Control

Building foundations and under-slab soil shall be pre-treated for termites with a minimum 5-year warranty.

- *See Section 033000 for concrete specifications*

- END OF SECTION –

31 40 00 - Shoring and Underpinning

31 41 00 SHORING

Shoring

Excavation shall be shored if required by OSHA or local regulations. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included. This must be done to the entire satisfaction of Northwest Facility Services, but the contractor shall assume full responsibility for the work. The Contractor shall make good, at no cost to Northwest, any damage caused by improper support or failure of shoring in any respect.

- END OF SECTION –

Division 32 – Exterior Improvements

32 10 00 - Bases, Ballasts, and Paving

32 10 00 General Information

Building Egress

Provide footings for flat work at all entry and exit doorways. Any sidewalk or flatwork that occurs within the radius of a door swing shall have footings around its perimeter. This footing will either be integral to the footings and foundation of a new structure or pinned/doweled to the footings of an existing structure. This footing shall be extended below frost line to prevent heaving of concrete at building entries/exits.

Control Joints

All sidewalks, drive and exterior flatwork shall be a minimum of 6” in depth. Sidewalks shall have a minimum width of 8-ft. unless otherwise specified. No flatwork shall exceed 15-ft of linear measurement in any direction without control joints. Saw joints shall be placed perpendicular to the finished edge at intervals to create uniform appearance unless angular saw joint patterns are approved in advance by Facility Services.

Construction Joints

Locate and install construction joints so that they do not impair strength or appearance of the structure, as acceptable to Northwest.

1. Locate construction joints at mid span (middle third) unless noted otherwise. Provide 2-by-4 horizontal keys at construction joints for shear transfer.
2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

Pinning/Doweling

Where new concrete is poured, use No. 5 reinforcing bar, pinned (inserted) a minimum of 6 in. into the existing concrete, spaced 24” on center, maximum.

Reinforcing

All concrete shall be reinforced. Reinforcement shall be supported on chairs or bolsters shall be located uniformly at mid-depth of the slab thickness.

1. Repair damages before placing concrete. Accurately position, support, and secure reinforcement against displacement.
2. Install welded 6x6-w2.9xw2.9 wire fabric, or a Northwest Facility Services approved substitute of equal caliber, in all exterior slabs, in lengths as long as is practical. Set wire ties so that ends are directed into concrete, not toward exposed concrete surfaces.

Placement, concrete

General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. All concrete shall be poured properly (such as performing vibration to remove air bubbles, etc.) in order to provide a smooth finish on non-walk surface.
4. All voids shall be filled with appropriate material, approved in advance by the Northwest Facility Services, while concrete is still green.
5. (The above filling shall be allowed only for minor imperfections, as determined by northwest Facility Services. Any gross number of imperfections will not be accepted.)
6. Northwest's standard is to accept only smooth finish surfaces. Improper installation shall be removed at cost of the Contractor.
7. Maintain reinforcing in proper position on chairs and/or bolsters during concrete placement.

Hot-Weather Placement: When pouring concrete in temperature conditions above 90 degrees F, use proper hot weather techniques including, but not limited to, the following:

1. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform, without puddles or dry areas.
2. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Northwest Facility Services.

Cold-Weather Placement: When pouring concrete in temperature conditions below 40 degrees F or forecast to drop below that temperature within 24 hours of the time concrete is to be placed, use proper cold weather techniques.

32 11 00 BASE COURSES

Subbase and Base Courses

Under pavements and walks, place subbase course material on prepared subgrade. Place base course material over subbase to pavement.

1. Shape subbase and base to required crown elevations and cross-slope grades.
2. Thickness: When thickness of compacted subbase or base course is 6 in. or less, place materials in a single layer. When thickness of compacted subbase or base course exceeds 6 in., place materials in equal layers, with no layer more than 6 in. thick or less than 3 in. thick when compacted.

32 14 00 UNIT PAVING

Stone Pavers

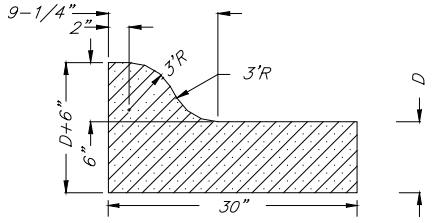
When using stone pavers the outer most course shall be pinned to the next course in. The exception shall be when the paver is held in place by a building structure.

Pins shall have a rough texture to insure anchoring.

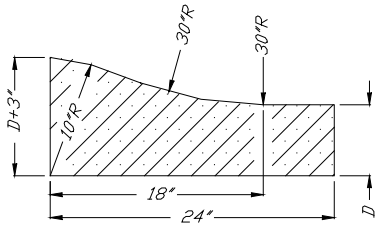
32 16 00 CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

Curbs

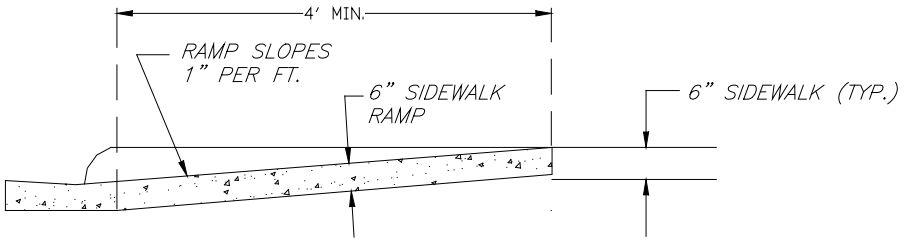
Curbs shall be 6 inches and of one of the three configurations below:



STANDARD ROLLOVER CURB



DRIVEWAY ENTRY



ZERO ENTRY ADA SIDEWALK

Control joints must be installed at intervals at no greater than 15-ft.

Dimensions

Sidewalks shall be of the minimum dimensions specified below. Any deviation from such shall be approved by the Northwest Project Manager.

1. Thickness: 6 in. minimum
2. Width: 8 ft. minimum

Allow 6" of additional width for any handrail requirements leaving an 8 ft. wide clear walk space.

Formation Specifications

A minimum of 6% entrained air must be used in all concrete that will be exposed to freezing and thawing and de-icing chemicals.

When sidewalks attach to existing structures (with footings below frost) the first 3-4 feet of connecting sidewalk shall have perimeter footers to prevent heaving at doorways. The sidewalk footer against the structure should be anchored to the structure.

See section 03 30 00 Cast-in-Place Concrete for additional requirements for campus utility tunnels.

Finishing

Hand-float the surface only as needed to produce a uniform surface. No finishing shall be accomplished with water standing on the surface.

Sidewalks shall be broom-finished, with 2-in. smooth edges and rounded corners.

Where new sidewalks intersect existing sidewalks, tie-ins shall align with existing joints whenever possible. Intersection walks shall use angled (by approximately 45 degrees) tie-ins as opposed to radius connections.

Where new sidewalks intersect a street or parking lot ADA detection warning plates shall be installed. *See* Section 32 17 00 ADA Detectable Warning Plates for specifications.

32 17 00 PAVING SPECIALTIES

Painted Traffic Lines and Markings

All standard parking spaces shall be painted white and 9-foot in width regardless of angle.

All ADA accessible parking spaces shall be 9-foot wide with an adjacent 5-foot wide access aisle on at least one side. Van accessible access aisles shall be provided in quantities as required by current ADA regulations. Parking space lines and curb shall be painted blue. The access aisle shall have blue hash marks. The ADA parking space shall have the universal symbol of accessibility emblem painted in white approximately 3'x4' in dimension. Northwest-provided template shall be utilized.

Traffic paint shall be Diamond Vogel brand or Northwest Facility Services approved equal.

ADA Detectable Warning Plates

Where Detectable Warnings are required by Accessibility Standards at Platform Edges (see Section 705 of 2010 ADA Standards), ADA compliant replaceable cast iron detectable warning plates shall be installed. Plates shall be bolted together with stainless steel bolts, or shall be interlocking type. Radius panels shall be used at any non-linear locations. Color shall be natural patina or black as directed by Facility Services.

Cast iron plates shall be manufactured by Neenah Foundry Company, Neenah, WI, ADA Solutions, Inc., Wilmington, MA, or Facility Services approved equal.

32 17 43 PAVEMENT SNOW MELTING SYSTEMS

Snow Melt System

Snowmelt system shall be a RayChem brand and shall use EM2-XR cable. An ETI brand controller, model APS-4, with ground fault capabilities shall be used. The only sensor on the system shall be a CIT-1 sensor #10001. Any other system, cable, controller and/or sensor must be approved by Northwest Facility Services.

- END OF SECTION -

32 41 00 - Bollards

32 41 00 BOLLARDS

Bollard Covers

Provide flat top 0.1719 inch thick (minimum) heavy duty, high density polyethylene (HDPE), UV-treated bollard covers or Northwest approved equal in sizes as required for the project application, and as approved by Northwest Facility Services. Basis of design bollard: https://www.postguard.com/product/7-bollard-cover/

- Vehicle Traffic Areas: Yellow color with Red reflective tape.
- Non-Vehicle Traffic Areas: Green color with White reflective tape.

- END OF SECTION –

32 80 00 - Irrigation

32 80 00 IRRIGATION SYSTEM

General

All elements comprising turf irrigation systems (e.g. sprinkler heads), installed new or reinstalled after groundwork, shall be placed flush with the ground. Provide adequate backfill around all irrigation heads, boxes, and appurtenances.

Any project that includes creation or modification of natural turf athletic fields should include installation of an irrigation system approved by Northwest Facility Services.

Any project that includes creation or modification of flowerbeds should include installation of an irrigation system approved by Northwest Facility Services.

- END OF SECTION –

32 90 00 - Planting

32 91 00 PLANTING PREPARATION

Topsoil Requirements

Provide a minimum of 4”- 6 inches of screened topsoil in all turf areas.

Topsoil must be free of rocks >1 inch, debris, and contaminants.

Provide topsoil with adequate organic matter to support vegetation; avoid heavy clay or excessively sandy material.

Topsoil Preparation

Scarify subgrade to a minimum depth of 4 inches prior to placing topsoil. Topsoil shall be placed loosely and not compacted beyond levels suitable for turf establishment.

Final topsoil surface must be smooth and graded to drain properly away from structures with no standing water. Remove stones >1 inch and other debris.

32 92 00 TURF AND GRASSES

Seeding

Seed mix shall be a tall Fescue blend equal to “Revolution Fescue Blend” with no crop seed and no noxious weed seed. Inert matter shall be <1%.

Seeding windows: Sept 1–Oct 15 or March 1–Apr 15, unless authorized by Northwest Facility Services.

Use approved seed matting. Loose straw coverings are not allowed. Hydromulch or bonded fiber matrix may be used.

Apply starter fertilizer at the time of seeding or immediately prior to seed placement.

Irrigation and Establishment

Contractor shall provide adequate irrigation for a minimum of 30 days after planting and continue until turf is established to the satisfaction of Northwest Facility Services.

Maintain consistently moist (but not saturated) soil during germination. Water lightly and frequently as needed to prevent drying.

Maintenance and Warranty

Provide weed control as necessary. Turf must reach 95% coverage with ≤5% weeds for acceptance. Turf that fails to establish during the first growing season shall be replaced at no cost to the Owner.

-END OF SECTION-

Division 33 – Utilities

33 00 00 - Utilities

33 00 10 General Information

- Location of Utilities: All utilities shall be located by a selected surveying company and/or Northwest Facility Services
- **Can "U" Dig? Northwest Missouri State University "Before You Dig" Policy**

  For all excavations, post installations, tree planting, and any other digging or ground penetration:

  1. Flag proposed excavation locations with white flags. Map the locations and obtain GPS coordinates when possible.
  2. Contact Facility Services (660) 562-1183 to request University-owned underground utility line locations.
  3. Contact Mo ONE CALL: 1-800-344-7483 to request Non-University owned underground utility line locations.
- **University-Owned Underground Utility Line Location Procedures**
- Northwest Facility Services notifies:
  - Shane Baumgart/Landscape Services 660-562-1473
  - Rick Allen/Maintenance 660-562-1355
  - Steve Chor/Telecommunications 660-562-1653
- Large Sculpture placements are to be cleared through Northwest Facility Services, which will initiate process on behalf of art students. See 121000 Art.
- **Everyone who digs on University property must follow these procedures.**

NOTE: Three business days are required for completing locations

- END OF SECTION -

33 40 00 - Stormwater Utilities

33 46 00 STORMWATER MANAGEMENT

Drainage Fill and Granular Leveling Course

Under slabs-on-grade, place drainage fill course on prepared sub grade.

Compact drainage fill to required cross sections and thickness. When compacted thickness of drainage fill is 6 in. or less, place materials in a single layer. When compacted thickness of drainage fill exceeds 6 in. thick, place materials in equal layers, with no layer more than 6 in. thick nor less than 3 in. thick when compacted.

- END OF SECTION –

33 70 00 - Electrical Utilities

33 71 73 ELECTRICAL UTILITY SERVICES

Secondary Service Entrance, underground

Provide underground secondary electrical service from pad-mounted transformer. Sizes of service entrance conductors and conduit are shown on drawings.

Transformer: Such shall be furnished and set in place by the electrical utility company. Exceptions will be determined on a project-by-project basis with approval by Northwest Facility Services. Provide a transformer pad coordinating location and size, and set conduit bends to receive primary and secondary conduits. Where direct burial primary is used, set conduit bend to receive primary cables.

Coordinate connection with Utility, and make connections to secondary terminals of transformer as required, all pursuant to Utility standards.

33 73 00 UTILITY SUBSTATIONS

Dry Type (Three Phase)

Standards: Transformers shall be of Siemens, or approved equals by Square D, GE, Hevi-Duty, Acme or Challenger. Provide transformers with KVA ratings as shown on the Drawings.

Campus Electrical System: 4160/2400V, three-phase primary. Transformers shall be compatible with the existing campus primary system with a secondary that matches current/proposed building needs.

Sound level shall not exceed that listed below.

KVA	***Decibels***
0-9	40
10-50	45
51-150	50
151-300	55

Outdoor Setup: Where located outdoors, provide transformers with weatherproof enclosures.

- END OF SECTION –

Division 40 – Process Integration

40 92 00 - Self-Contained Flow Controllers

40 92 49 VARIABLE FREQUENCY DRIVES

Variable Frequency Drives

General: Frequency drives shall be suitable for the application and compatible with the motor supplied with the driven equipment. All drives shall use transistorized technology. Drives shall be "burned in" at the factory for 24 hours at rated load and ambient temperature. Coordinate with the Temperature Control System supplier and verify that the signal to the drive is compatible with drive response so that system components such as ductwork, fans and motors are not overstressed.

1. Make: Furnish Graham, Eaton, Allen-Bradley, Westinghouse or approved equal variable frequency drives where specified or indicated.
2. The manufacturer shall provide startup assistance as required and in addition, provide appropriate training for the Northwest's operating personnel.
3. Furnish shop drawings including electrical noise calculations, drive enclosure elevations, internal wiring diagrams and schematics, and connection diagrams describing work to be performed on the mechanical equipment by other trades.
4. Each single drive or multiple drive installation shall be guaranteed by the equipment manufacturer not to affect other equipment connected to Northwest's electrical power distribution system.

Compliance: The drive shall be UL listed, ETL, or CSA certified and shall comply with the latest applicable standards of ANSI, NEMA, IEEE and the National Electric Code.

Labeling: Supply warning labels on the outside of the drive enclosure, near the motor, and near any associated motor driven equipment. The label shall read as follows: "Warning, if there is a power failure, the drive will automatically restart upon reapplication of line power. Automatic restart of the drive may cause injury to personnel working near the drive."

Mounting: The drive shall not be mounted on gypsum board or frame walls. In those locations, the drive shall be floor mounted or hung on a floor mounted steel rack not in contact with any wall. The drive may be mounted on masonry or concrete walls provided that the walls are a minimum of 8 in. thick.

Specifications: The drive shall be equipped with the following features, unless otherwise approved by Northwest Design and Construction:

1. Hand/Off/Auto switch or separate start/stop and manual/auto switches
2. Adjustable maximum and minimum speed
3. Adjustable current or torque limits
4. Automatic restart in auto mode after power failure after safe coast-down time

5. Speed indicator for 0 to 100 percent speed
6. Indicating lights for normal and malfunction conditions
7. Manual speed adjustment
8. Thermal overload relay and contacts
9. Ammeter calibrated for 0 to 150 percent load
10. Disconnect switch – which is able to be padlocked – with current limiting fuses
11. Motor starter with manual bypass switch, or contactor, to bypass the drive, isolate the drive, and operate the motor across the line at constant speed; all control functions in the bypass mode shall be the same as in the automatic mode
12. Adjustable timed linear acceleration and deceleration of sufficient duration to prevent damaging overstresses
13. Input line overvoltage, undervoltage, phase loss, surge and over frequency protection
14. Overtemperature protection
15. Output short circuit (phase-phase and phase-ground) and open circuit protection. Note, motor may have a disconnect switch on load side of drive.
16. 4-20 ma current follower plus a pressure to electric transducer to convert a 3-15 psi signal to 4-20 ma with offset, gain and trim controls
17. When used in HVAC systems, static pressure indicator on the door of the enclosure showing the actual duct static pressure being controlled
18. Protocol Board for connection to building energy management system

Standards: The drive system shall provide a minimum of 95 percent power factor at all speeds. It shall be suitable of appropriate voltage (plus 10 percent, minus 5 percent on any or all phases) and 60-Hertz (plus/minus 2 Hz) input. The drive efficiency shall be a minimum of 94 percent at 100 percent speed and load.

1. The drive shall provide constant volts per hertz ratio to the motor throughout the speed range.
2. The drive shall operate continuously in an ambient temperature of 0 degrees C to 40 degrees C and humidity of 0 to 95 percent, non-condensing.
3. The drive enclosure shall be NEMA 1 and be completely front accessible. Provide internal filters and ventilating fans as necessary. All drive components shall be factory wired in a single or multi-section enclosure. Floor mounted enclosures shall be installed on a 4-in. high concrete pad.
4. The drive shall be capable of frequency jump control as a standard feature to prevent fan system resonance at critical frequencies.

- END OF SECTION -

Appendix A – Product Information

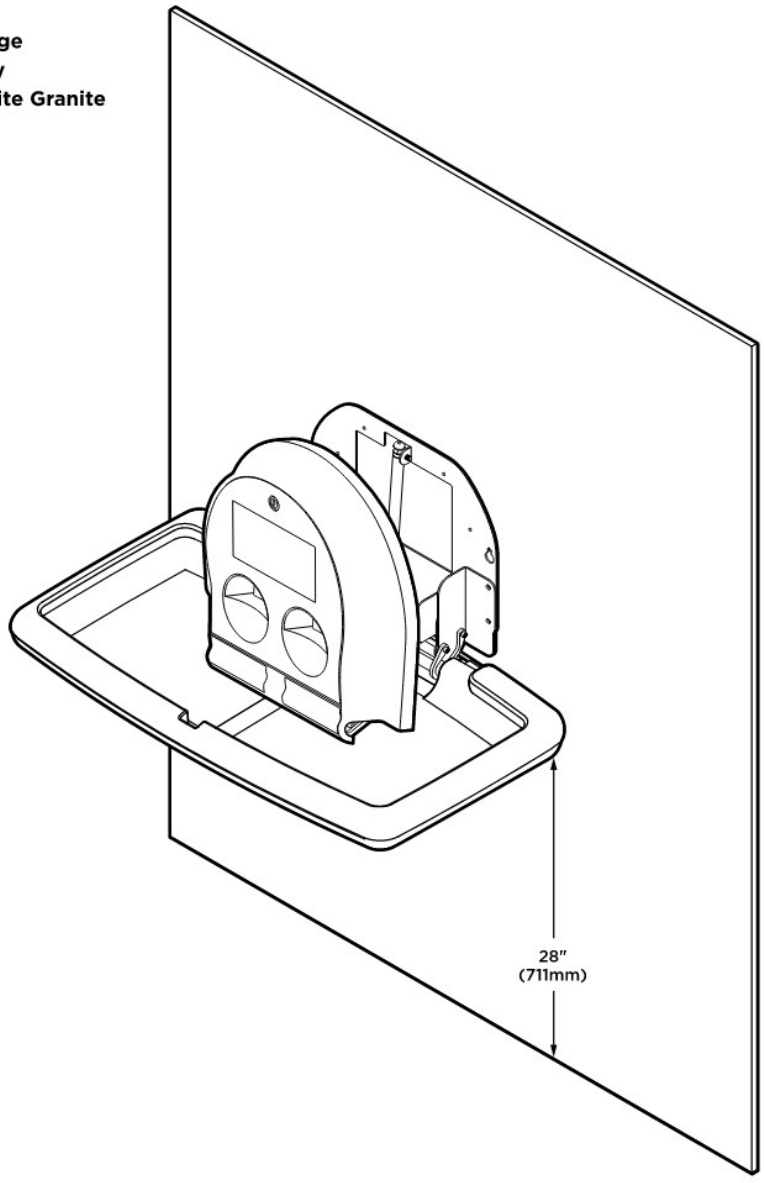
Koala Bear Care Diaper Changing Stations

10 28 13

KB300 Baby Changing Station
Technical Data Sheet

Color

- KB300-00 Beige
- KB300-01 Grey
- KB300-05 White Granite

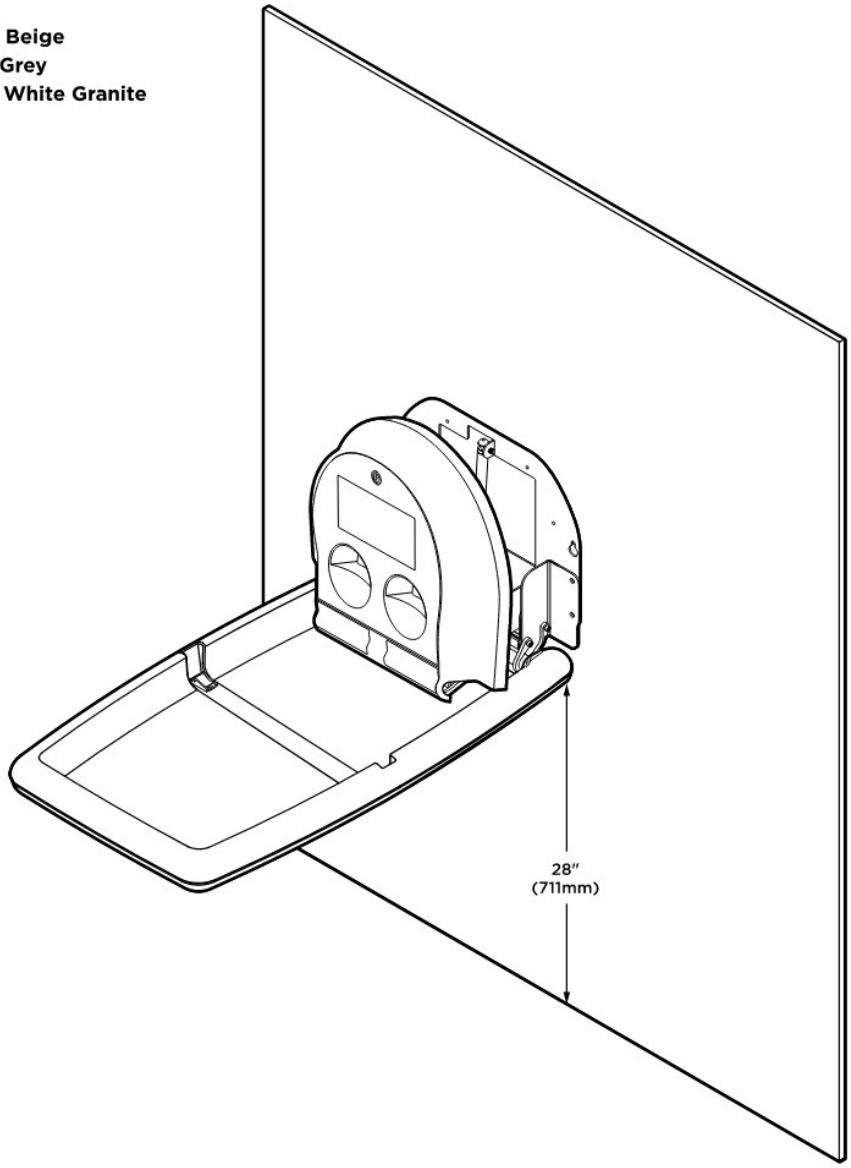


*Diagrams are not to scale.

KB301 Baby Changing Station
Technical Data Sheet

Color

- **KB301-00 Beige**
- **KB301-01 Grey**
- **KB301-05 White Granite**



*Diagrams are not to scale.

Kimberly Clark Paper Towel Dispenser

10 28 13

Kimberly-Clark PROFESSIONAL

Search for...

HARD ROLL

SHARE

Kimberly-Clark Professional™ Sanitouch Manual Hard Roll Towel Dispenser

PRODUCT CODE #09990

Premium

COLOR:	Black
BRAND:	Kimberly-Clark Professional™
UNIT SIZE:	12.63" x 16.13" x 10.2"
UNITS PER CASE:	1

Product Options:

Color

Black

White

Type

1.5" core

Purchase Options

Request a Quote

Find a Distributor

DESCRIPTION

Reduce maintenance time and run-outs with a high capacity washroom towel system. The Kimberly-Clark Professional™ Hard Roll Tow nser is a reliable and efficient hand-drying system that is perfect for your workplace, retail location, office or high-traffic location. This man owel dispenser comes in various color options and configurations and is compatible with 1.5" or 1.75" core roll towels, depending on the mo is wall mount dispenser features a durable and sleek design, so it will go with any washroom decor. Kimberly-Clark Professional™ Hard Roll Towel Dispensers are compatible with Kleenex® and Scott®Brand Hard Roll towels. After all, you have better things to think about than changing your business' paper towel rolls!

Hospeco Sanitary Napkin Receptacle

10 28 13

hospeco
BRANDS GROUP

Health Gards® Plastic Menstrual Care Receptacle

Safe and Sanitary Disposal of sanitary napkins and tampons is an important part of a complete personal care solution for public restrooms. Help prevent plumbing problems by providing lined waste receptacles in each stall to Encourage proper disposal and Discourage flushing of waste.

Key Features

- Waste receptacles provide hygienic feminine napkin disposal in the restroom
- Helps prevent plumbing problems by encouraging proper disposal and discouraging flushing of waste
- Surface Mount
- Made from PPC, it is lightweight, durable and resists staining

SKU	250-201W
Brand	Health Gards®
Case LxWxH	0 x 0 x 0
Case Weight (lbs.)	0
Color	White
Country of Origin	United States
Cube	0.37
HTS CODE	3924.90.00.99
Inner Carton Height (in)	5.7
Inner Carton Length (in)	9.4
Inner Carton Weight (lb)	0.85
Inner Carton Width (in)	11.8
Material	PPC
NMFC	156600S3
Packaging Put/Up	1 ea
Pallet Hi	4
Pallet Quantity	192
Pallet Ti	48
Sell UOM LxWxH	EA - 11.8 x 9.4 x 5.7
Size	8.75 in x 4.875 in x 10.5 in
UPC	075289015991
GTIN ITF-14 Case	10075289015998

P: 800.942.9199 F: 216.279.0019 hospecobrands.com

Wiping Solutions • Gloves • Cleaning Chemicals • Textiles + Linens • Personal Care • Odor Control
Controlled Environments • Safety • Specialty Products

Rochester Midland Sanitary Napkin Vendor

10 28 13

VENDOR, J6-RC

Features

All-metal, all-welded vendor construction
Rounded corners
Attractive 'refrigerator' finish
Easy to mount
Individual, die-cast coin mechanisms
Silk-screened graphics
ADA compliant handles
Most trouble-free vendors on the market today

Specifications

Product Code: 25166500

Shipping Weight: 21 LB

Cubes: 1.32 FT

Capacity: 17 pads, 26 tampons

Dimensions: 10 3/4 W x 31 1/4 H x 5 1/2 D

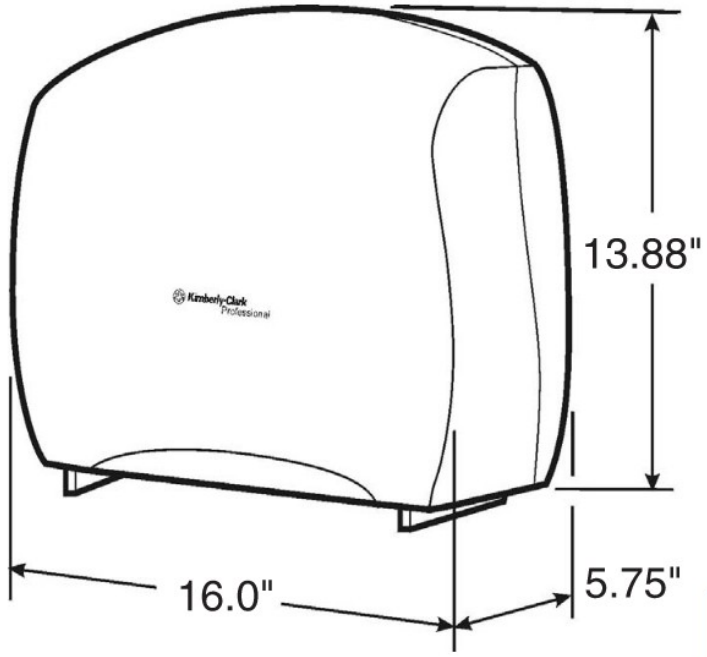
The J6-RC Vendor is one of our best-selling dual vendors. Finished in White Enamel, its larger size makes it perfect for middle to larger volume users.

Kimberly-Clark Toilet Tissue Dispenser

10 28 13

SERIES-I IN-SIGHT® DISPENSERS

BATH TISSUE *Dispensers*



09507

SERIES-I IN-SIGHT® JRT® JR. ESCORT®

Dispenser made of durable plastic. Front cover includes provision for custom deco strip. Designed to dispense a 9.38" diameter x 3.8" wide tissue roll with 3.25" diameter core, plus stub roll. Dispenser holds more than the equivalent, in length, of five standard rolls of bath tissue. Features hinged front cover, push button for easy open or common key lock to reduce pilferage, and tear-off bars on side and front of dispenser opening. Dispensers shipped one per case. ***Suggested Mounting Height: 30"***

NOTE: Unless otherwise noted, suggested mounting height is the distance from the floor to the bottom of the dispenser.

Dyson Airblade V Hand Dryer

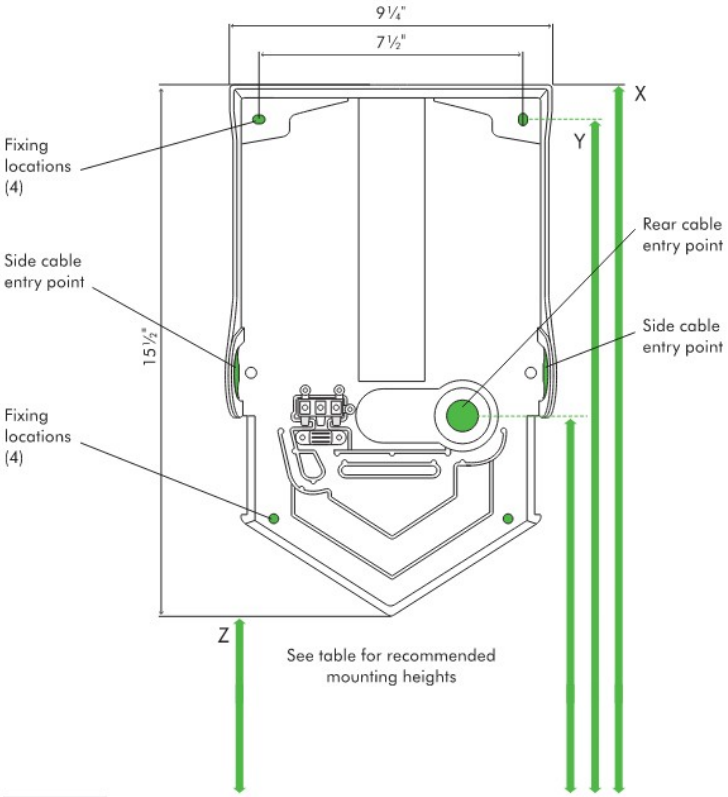
10 28 13

dyson airblade V

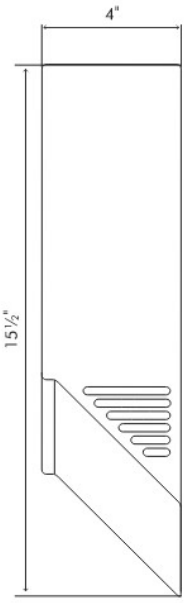
TECHNICAL SPECIFICATION

HU 02

REAR ELEVATION



SIDE ELEVATION



All dimensions shown in inches (+/- 3/16 inch)

FLOOR

Recommended installation heights from floor			
Male	X 52⅛"	Y 51 3/16"	Z 36⅝"
Female	X 50¾"	Y 49 13/16"	Z 35¼"
Child or disabled	X 42 5/16"	Y 41⅜"	Z 26 13/16"
Child 5-8	X 37½"	Y 36 7/16"	Z 22"
Child 8-11	X 41 7/16"	Y 40½"	Z 25 15/16"
Child 11-14	X 44⅝"	Y 43⅝"	Z 29"

Machine dimensions
Height 15½" Width 9 7/32" Depth 4"

Minimum clearance	
81 1/16" clearance either side and 13/16" above machine.	
Cable entry point from floor	
Male	42⅞"
Female	41½"
Child or disabled	33 3/16"
Child 5-8	28¼"
Child 8-11	32 3/16"
Child 11-14	35¼"

Distributed By

RESTROOMDIRECT
COMMERCIAL RESTROOM ACCESSORIES

WWW.RESTROOMDIRECT.COM 704•937•2673 129 Oak Park Dr., Unit A, Mooresville, NC 28115

dyson airblade V

HU 02

Electrical

Input voltage/Frequency: 120-127 V 50&60 Hz

Standby power consumption: Less than 0.5 W

Motor specification: 1,000 W digital brushless motor

Heater type: None

Construction

Fascia: Polycarbonate

Antibacterial coating type:
HU02 (Sprayed Nickel) contains antibacterial additive in paint.
HU02 (White) contains antibacterial moulded additive.
Can help prevent the growth of bacteria.

Back plate mounting bracket: ABS/PBT Plastic

Exterior screw type: Anti-tamper 4 mm Pin-Hex

Water ingress protection to IP24

Filter

HEPA filter (Glass fibre and fleece prelayer)

99.97% of particles captured to the size of 0.3 microns

Operation

Touch free capacitive sensor activation

Hand dry time measurement: 12 seconds
(Measurement based on NSF Protocol P.335)

Sound power level: 79 dB (A)

Sound pressure level @ 2 m: 63 dB(A)[1]

Operation lock-out period: 30 seconds

Airspeed at aperture: 690 km/h / 430 mph

Maximum altitude: 2,000 metres / 6,561 ft.

Operating temperature range: 0°C-40°C / 32°F-104°F

Logistics

Single unit order code:
Sprayed Nickel: 307174-01, White: 307173-01

Unit barcode:
Sprayed Nickel: 885609009933, White: 885609009896

Net weight: 2.9 kg / 6.17 lbs

Packaged weight: 4.0 kg / 8.81 lbs

Packaged dimensions:
(H)145 × (W)455 × (D)274 mm / (H)5 3/4" × (W)17 7/8" × (D)10 3/4"

Standard warranty

5 year warranty

Product range

Sprayed Nickel

White

[1]Sound pressure measured at 2 m distance, in a semi-anechoic chamber.

CARBON TRUST CO2 MEASURED

NSF

QUIET MARK

The Carbon label is a trademark of the Carbon Trust.
The NSF logo is the registered trademark of NSF International.
Quiet Mark is a registered trademark of the Noise Abatement Society.

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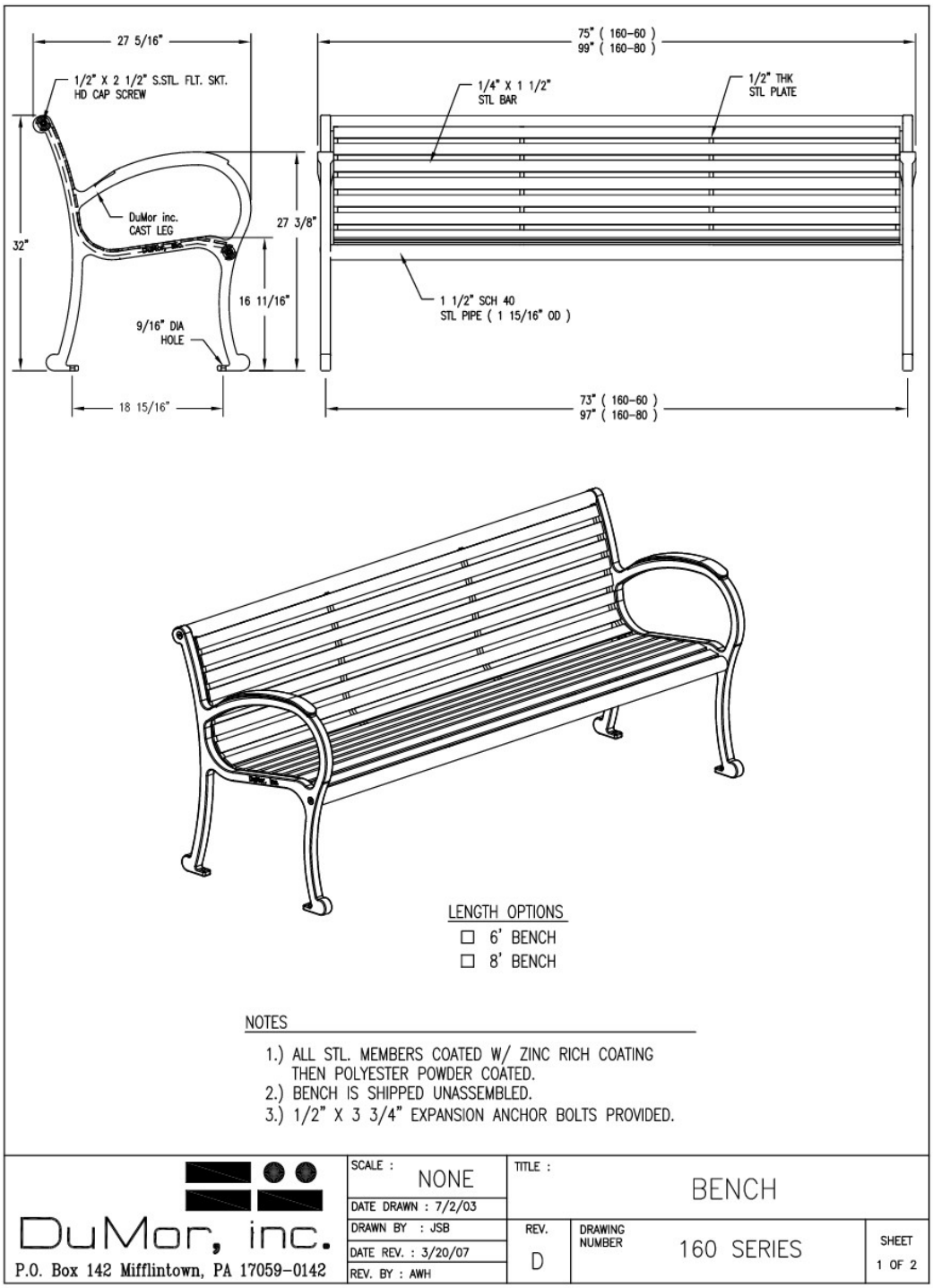
Dumor Benches

12 93 43

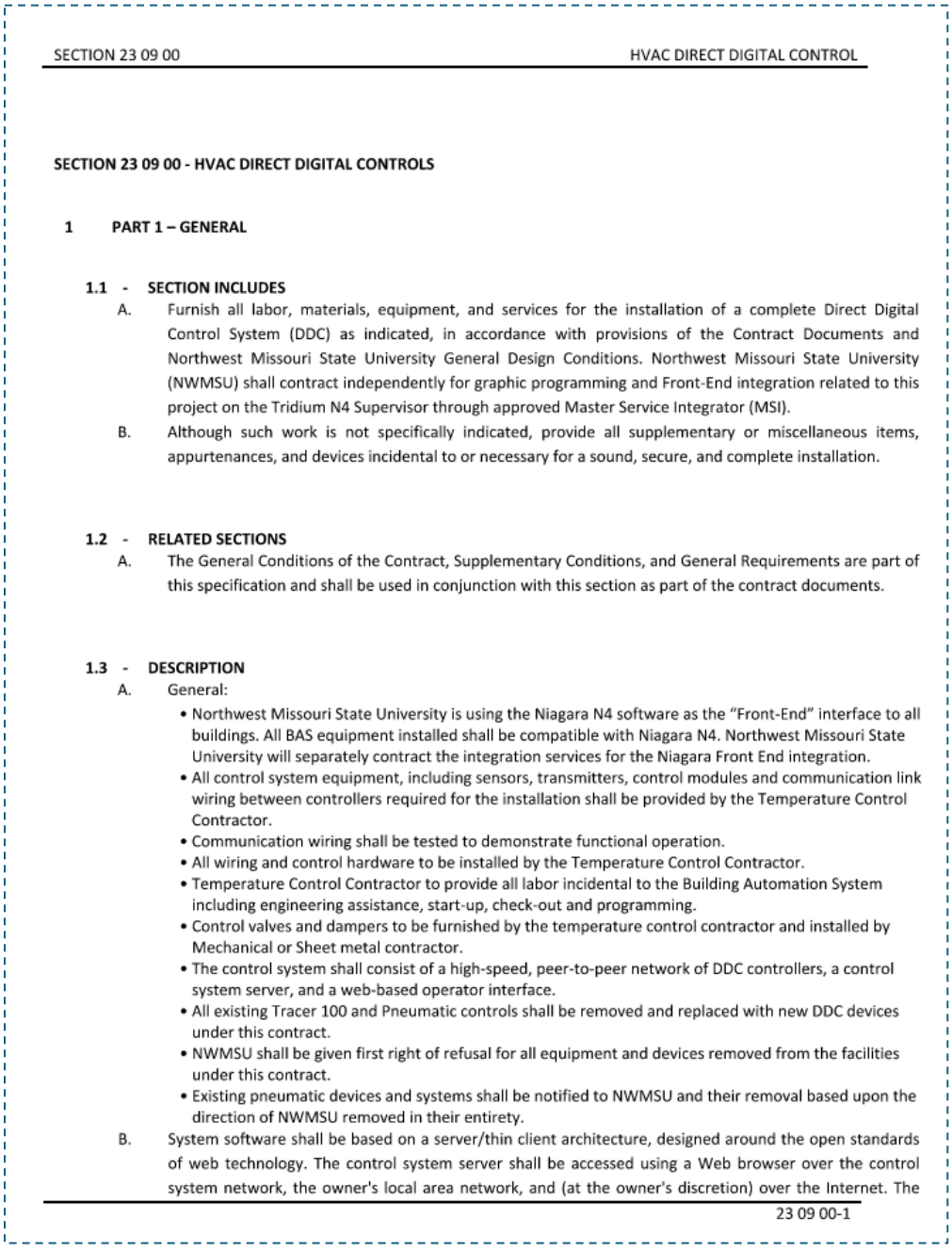
Click the page image below to open the Dumor benches Spec sheet file



Northwest Missouri State University Controls Specification

23 09 00 HVAC Direct Digital Control
23 09 23 Direct Digital Controllers and Networks
23 09 24 Graphical User Interface Integration
25 00 00 Enterprise Integrated Facility Management and Control System

Click the page image below to open the Northwest Controls Specification file



SECTION 23 09 00 HVAC DIRECT DIGITAL CONTROL

SECTION 23 09 00 - HVAC DIRECT DIGITAL CONTROLS

1 PART 1 – GENERAL

1.1 - SECTION INCLUDES

A. Furnish all labor, materials, equipment, and services for the installation of a complete Direct Digital Control System (DDC) as indicated, in accordance with provisions of the Contract Documents and Northwest Missouri State University General Design Conditions. Northwest Missouri State University (NWMSU) shall contract independently for graphic programming and Front-End integration related to this project on the Tridium N4 Supervisor through approved Master Service Integrator (MSI).

B. Although such work is not specifically indicated, provide all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation.

1.2 - RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.

1.3 - DESCRIPTION

A. General:

- Northwest Missouri State University is using the Niagara N4 software as the "Front-End" interface to all buildings. All BAS equipment installed shall be compatible with Niagara N4. Northwest Missouri State University will separately contract the integration services for the Niagara Front End integration.
- All control system equipment, including sensors, transmitters, control modules and communication link wiring between controllers required for the installation shall be provided by the Temperature Control Contractor.
- Communication wiring shall be tested to demonstrate functional operation.
- All wiring and control hardware to be installed by the Temperature Control Contractor.
- Temperature Control Contractor to provide all labor incidental to the Building Automation System including engineering assistance, start-up, check-out and programming.
- Control valves and dampers to be furnished by the temperature control contractor and installed by Mechanical or Sheet metal contractor.
- The control system shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface.
- All existing Tracer 100 and Pneumatic controls shall be removed and replaced with new DDC devices under this contract.
- NWMSU shall be given first right of refusal for all equipment and devices removed from the facilities under this contract.
- Existing pneumatic devices and systems shall be notified to NWMSU and their removal based upon the direction of NWMSU removed in their entirety.

B. System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a Web browser over the control system network, the owner's local area network, and (at the owner's discretion) over the Internet. The

23 09 00-1

Lithonia Safety Lighting

26 52 00

Click the page image below to open the Lithonia Safety Lighting Spec Sheet file

LITHONIA LIGHTING®

FEATURES & SPECIFICATIONS

INTENDED USE — Provides a minimum of 90 minutes illumination for the rated wattage upon loss of AC power to meet code required emergency lighting. Ideal for applications requiring low profile, emergency unit for lower mounting heights.

CONSTRUCTION — The housing is a standard white thermoplastic with a compact and low-profile design with all-inclusive lamp, reflector and lens assembly. It is 5VA flame rated and impact-resistant.

OPTICS — The typical life of the LED is 10 years. One, 0.75W white LED per lamp head.

ELECTRICAL — Dual-voltage 120/277 standard.

Bi-color LED status indicator for battery condition. (Green-normal, Red-check battery).

One watt of remote capacity available.

BATTERY: 3.6V maintenance-free, rechargeable, nickel-cadmium.

INSTALLATION — Wall mount and ceiling mount. Surface mount back plate fits most industry standard size junction boxes and snaps into place.

LISTINGS — UL Listed. Meets all applicable requirements for UL 924, NFPA 101 (current Life Safety Code), NFPA 70 (NEC), California Energy Commission Title 20 section 1605.3 (W)(4), FCC and OSHA. Indoor damp location 50°F to 104°F (10°C to 40°C) listed standard.

WARRANTY — 2-year limited warranty.

NOTE: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

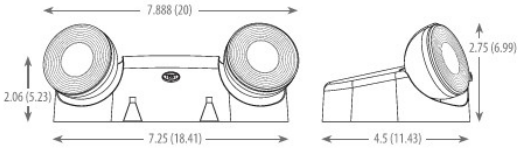
Low Profile Emergency Light

EU2L

LISTED

MOUNTING AND SPECIFICATIONS

All dimensions are inches (centimeters) unless otherwise indicated.



Specifications

Width: 7.88 (20)

Depth: 2.75 (6.99)

Height: 4.5 (11.43)

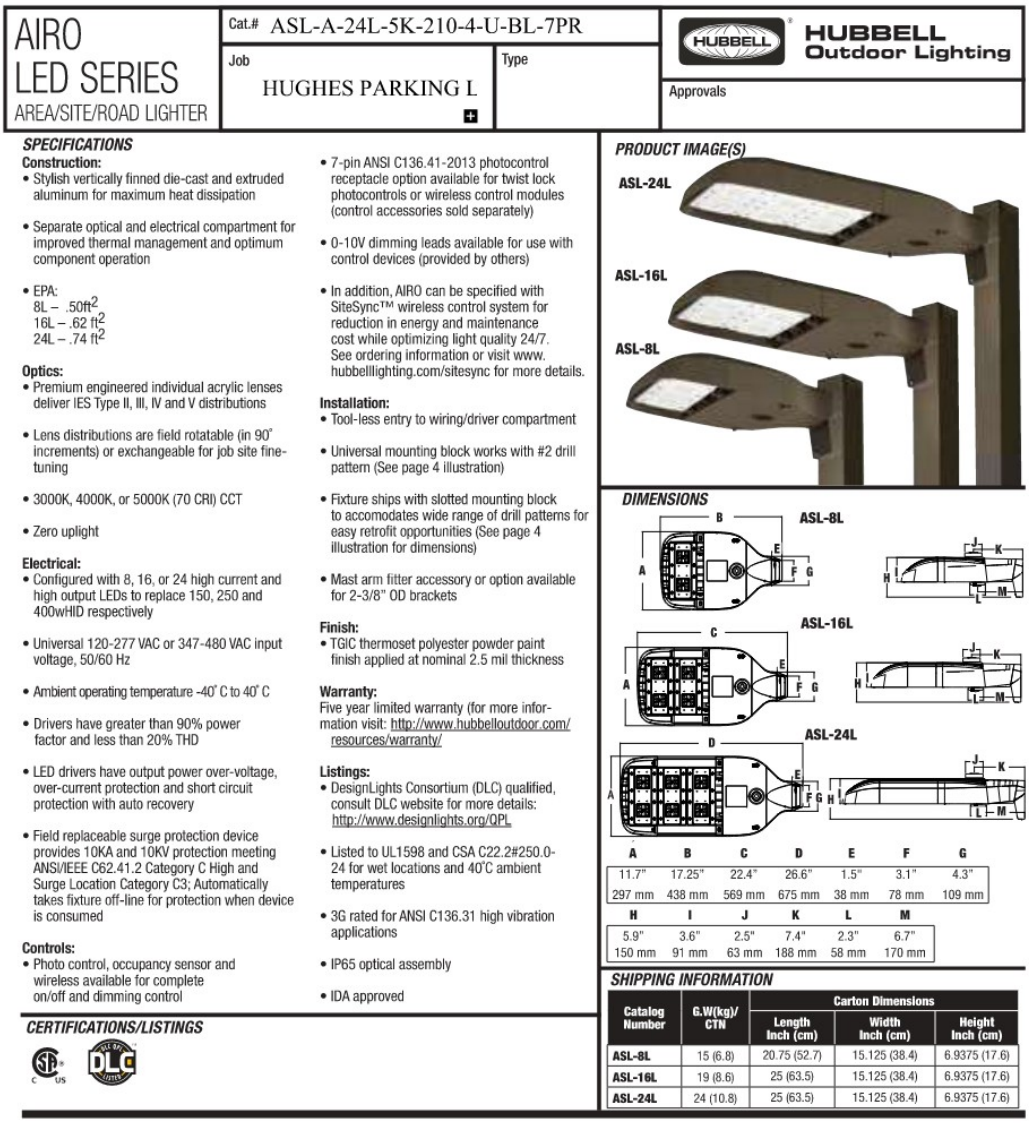
Weight: 0.7 lbs. (.32 kg)

EMERGENCY EU2L

Hubbell Street and Parking Lighting

26 56 00

Click the page image below to open the Hubbell Lighting Spec Sheet file



AIRO
LED SERIES
AREA/SITE/ROAD LIGHTER

Cat.# ASL-A-24L-5K-210-4-U-BL-7PR

Job: HUGHES PARKING L

Type:

HUBBELL Outdoor Lighting

Approvals

SPECIFICATIONS

Construction:
- Stylish vertically finned die-cast and extruded aluminum for maximum heat dissipation
- Separate optical and electrical compartment for improved thermal management and optimum component operation
- EPA:
  8L – .50ft²
  16L – .62 ft²
  24L – .74 ft²

Optics:
- Premium engineered individual acrylic lenses deliver IES Type II, III, IV and V distributions
- Lens distributions are field rotatable (in 90° increments) or exchangeable for job site fine-tuning
- 3000K, 4000K, or 5000K (70 CRI) CCT
- Zero uplight

Electrical:
- Configured with 8, 16, or 24 high current and high output LEDs to replace 150, 250 and 400wHID respectively
- Universal 120-277 VAC or 347-480 VAC input voltage, 50/60 Hz
- Ambient operating temperature -40° C to 40° C
- Drivers have greater than 90% power factor and less than 20% THD
- LED drivers have output power over-voltage, over-current protection and short circuit protection with auto recovery
- Field replaceable surge protection device provides 10KA and 10KV protection meeting ANSI/IEEE C62.41.2 Category C High and Surge Location Category C3; Automatically takes fixture off-line for protection when device is consumed

Controls:
- Photo control, occupancy sensor and wireless available for complete on/off and dimming control
- 7-pin ANSI C136.41-2013 photocontrol receptacle option available for twist lock photocontrols or wireless control modules (control accessories sold separately)
- 0-10V dimming leads available for use with control devices (provided by others)
- In addition, AIRO can be specified with SiteSync™ wireless control system for reduction in energy and maintenance cost while optimizing light quality 24/7. See ordering information or visit www.hubbelllighting.com/sitesync for more details.

Installation:
- Tool-less entry to wiring/driver compartment
- Universal mounting block works with #2 drill pattern (See page 4 illustration)
- Fixture ships with slotted mounting block to accomodates wide range of drill patterns for easy retrofit opportunities (See page 4 illustration for dimensions)
- Mast arm fitter accessory or option available for 2-3/8" OD brackets

Finish:
- TGIC thermoset polyester powder paint finish applied at nominal 2.5 mil thickness

Warranty:
Five year limited warranty (for more information visit: http://www.hubbelloutdoor.com/resources/warranty/

Listings:
- DesignLights Consortium (DLC) qualified, consult DLC website for more details: http://www.designlights.org/QPL
- Listed to UL1598 and CSA C22.2#250.0-24 for wet locations and 40°C ambient temperatures
- 3G rated for ANSI C136.31 high vibration applications
- IP65 optical assembly
- IDA approved

CERTIFICATIONS/LISTINGS

PRODUCT IMAGE(S)

ASL-24L

ASL-16L

ASL-8L

DIMENSIONS

ASL-8L

ASL-16L

ASL-24L

A	B	C	D	E	F	G
11.7"	17.25"	22.4"	26.6"	1.5"	3.1"	4.3"
297 mm	438 mm	569 mm	675 mm	38 mm	78 mm	109 mm

H	I	J	K	L	M
5.9"	3.6"	2.5"	7.4"	2.3"	6.7"
150 mm	91 mm	63 mm	188 mm	58 mm	170 mm

SHIPPING INFORMATION

Catalog Number	G.W(kg)/CTN	Carton Dimensions		
		Length Inch (cm)	Width Inch (cm)	Height Inch (cm)
ASL-8L	15 (6.8)	20.75 (52.7)	15.125 (38.4)	6.9375 (17.6)
ASL-16L	19 (8.6)	25 (63.5)	15.125 (38.4)	6.9375 (17.6)
ASL-24L	24 (10.8)	25 (63.5)	15.125 (38.4)	6.9375 (17.6)

CONFIGURABLE ORDERING INFORMATION NEXT PAGE

HUBBELL Outdoor Lighting • Hubbell Outdoor Lighting • 701 Millennium Boulevard • Greenville, SC 29607 • Phone: 864-678-1000

Due to our continued efforts to improve our products, product specifications are subject to change without notice.

Providence Sidewalk and Pedestrian Lighting

26 56 00

Click the page image below to open the Providence Lighting Spec Sheet file

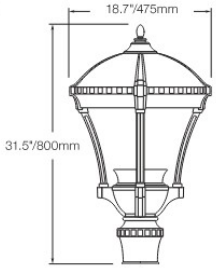
Providence® MicroCore™ – Medium Housing PROV

TYPE PROV-T5-32LED-5K-700-BL-DF-CLR-STND_MNT-WIRED120-277

FEATURES

- Reliable, uniform, glare free illumination
- Types II, III, IV, V and custom distributions[4]
- 3000K, 4000K, 5000K CCT
- 0-10V dimming ready
- Integral surge suppression
- LifeShield™ thermal protection
- 14 standard powder coat finishes

SPECIFICATIONS



- Diameter: 18.7" / 475 mm
- Height: 31.5" / 800 mm
- Weight: 29 lbs
- EPA: 0.96
- IP Rating: 65

3000K and warmer CCTs only

ORDERING INFORMATION

MODEL	1	2	3	4	5		6	7
PROV	T5	32LED-5K	700	BL	DF	CLR		STND
	Light Engine	CCT	Drive Current	Finish	Options		Controls	Mounting

1. LIGHT ENGINE

T2	*Type II*
T3	*Type III*
T4	*Type IV*
T5	*Type V*

2. COLOR TEMPERATURE

32LED -3K	*3000K CCT, 70CRI*
32LED-4K	*4000K CCT, 70CRI*
32LED-5K	*5000K CCT, 70CRI*

Additional CCT's and 560nm monochromatic amber available by request[4]

3. DRIVE CURRENT

700	*700mA, 75 watts*
450	*450mA, 48 watts*

4. FINISH

Standard Color

AGN	*Antique Green*
BL	*Black*
BLT	*Matte Black*
CRT	*Corten*
DB	*Dark Bronze*
DGN	*Dark Green*
LG	*Light Grey*
MAL	*Matte Aluminum*
MDB	*Bronze Metallic*
MG	*Medium Grey*
TT	*Titanium*
VBU	*Verde Blue*
WDB	*Weathered Bronze*
WH	*Arctic White*

4. FINISH (CONT)

Premium Color

SFM	*Seafoam*
SHK	*Shamrock*
SPP	*Salt and Pepper*
WCP	*Weathered Copper*
RAL	*RAL 4 digit Color*
CUSTOM	*Custom Color*

5. OPTIONS *(may choose as noted)*

Fuse may choose one

SF	*120 or 277 Line Volts*
DF	*208 or 240 Line Volts*

Finish

SPK	*Decorative spike*
BPS	*Struts painted brass*
PFN	*Finial painted brass*

Optics may choose one

LDL	*Lightly diffused lens*
CLR	*Clear flat lens*
HSS	*House Side shield for Type 4*

Accessories may choose one

EPA-C	*Egress-Contemporary[3]*
EPA-T	*Egress-Traditional[3]*

Mounting may choose one

PT23	*Slips Over a 2 3/8" x 4" Tenon*
PT3	*Slips Over a 3"x 4" Tenon*

6. CONTROL

PCA-C	*Rotatable photocell-Contemporary*
PCA-T	*Rotatable photocell-Traditional*
SCP	*Sensor Control Programmable, pole accessory ordered separately[1,2]*

7. MOUNTING

Standard configuration slips over a 4" DIA open top pole or may choose one.

Wall Mount Arm

WMA7	WMA57	WMA35U
WMA55	WMA9U	WMA36U
WMA56	WMA22U	

Pole Mount Arm

TRA5U-4	TRA5U-5	
TRA6U-4	TRA6U-5	
TRA55-4	TRA55-5	
TRA57-4	TRA57-5	TRA56
SLA1	SLA1-2	
SLA8U-4	SLA8U-5	
SLA22U-4	SLA22U-5	

Pier Mount

PM1	PM2	PM3

Option

AD5

NOTE:

1. *Pole accessory with motion sensor and daylight photo-control for California Title 24 section 130.2 compliance. For complete spec sheet and ordering information, visit www.aal.net/products/sensor_control_programmable/*
2. *Handheld commissioning tool is required to separately configure or adjust any number of SCP sensors*
3. *Not compatible with PCA-C nor PCA-T*
4. *Consult factory*

architectural area lighting
ARCHITECTURAL AREA LIGHTING
17760 Rowland Street | City of Industry | CA 91748
P 626.968.5666 | F 626.369.2695 | www.aal.net

JOB HUGHES PARKING LOT
TYPE
NOTES PROV-T5-32LED-5K-700-BL-DF-CLR-STND_MNT-WIRED120-277V

| 1 |

Providence Bollard Lighting

26 56 00

Click the page image below to open the Providence Bollard Spec Sheet file

architectural arealighting

PROB

BOLLARD

DATE: | LOCATION:

TYPE: | PROJECT:

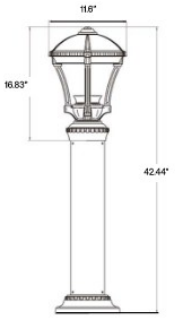
CATALOG #:

Providence® Bollard

FEATURES

- Reliable uniform illumination
- True IES Type 2, 3, 4, and 5 distributions
- 3000K , 4000K, 5000K CCT
- 0-10V dimmable
- 20kV/10kA surge suppression
- Thermal protection

3000K and warmer CCTs only



	Weight
PROB	27 lbs / 12 kg

SPECIFICATIONS

HOUSING

- Luminaire shall have discrete optical and gear compartments that do not share any physical housings
- All housing components shall be die-cast aluminum, sealed with continuous silicone rubber gaskets
- Standard configurations shall have a clear flat tempered glass lens
- All internal and external hardware shall be stainless steel
- Optical bezel finish shall match the luminaire housing
- Luminaire finish shall consist of a five stage pretreatment regimen with a polymer primer sealer, oven dry off, and top coated with a thermoset super TGIC polyester powder coat finish
- Luminaire finish shall meet the AAMA 605.2 performance specification which includes passing a 3000 hour salt spray test for corrosion resistance

LED/OPTICS

- LEDs shall be mounted to a metal printed circuit board assembly (MCPCB) with a uniform conformal coating over the panel surface and electrical features
- LED optics shall be clear injection molded PMMA acrylic
- MCPCB and optic shall be sealed to a die-cast anodized aluminum heat sink with an injection molded silicone rubber gasket. IP66

INSTALLATION

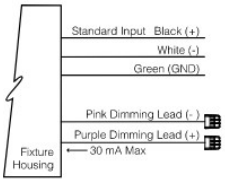
- Fixture shall slip over two 12" x 10" x 2" anchor bolts supported by hex nuts and washers to level fixture. Provision for water drainage at footing is recommended
- One-piece cast aluminum arms accept the standard 3" slip fitter on the Providence fixture
- Arms are prewired with quick disconnects
- Wall mounted arms do not include wall mounting hardware
- Pole mounted arms use 3/8-16 hardware bolts for attaching to the pole
- Driver assembly shall be mounted to a prewired internal tray with quick disconnects for removal
- Luminaire shall have tool-less service access to the gear compartment. Driver and surge suppressor shall be mounted to a prewired tray with quick disconnects that may be removed from the gear compartment

ELECTRICAL

- Luminaires shall have integral surge protection that shall be U.L. recognized and have a surge current rating of 10,000 Amps using the industry standard 8/20uSec wave and surge rating of 372J
- Drivers shall be U.L recognized with an inrush current maximum of <20.0 Amps maximum at 230VAC
- Drivers shall not be compatible with current sourcing dimmers, consult factory for current list of known compatible dimming systems, approved dimmers include Lutron Diva AVTV, Lutron Nova NFTV and NTFTV

ELECTRICAL (CONTINUED)

- Luminaires not configured with an optional control system shall be provided with 0-10V purple and pink dimming leads



CERTIFICATIONS

- Luminaire shall be listed with ETL for outdoor, wet location use, UL1598, UL 8750 and Canadian CSA Std. C22.2 no.250
- IDA approved, 3000K and warmer CCTs only

WARRANTY

- 5 year warranty

Current

currentlighting.com/aal

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Intermatic Astronomic Time Clock

26 56 00

Click the page image below to open the Intermatic Astronomic Time Clock Spec Sheet file

INTERMATIC

Electronic Timer Control - Astronomic 7-Day/365 Day 1-Circuit Electronic Control, 120-277 VAC, SPDT, Indoor Metal Enclosure

Item ET2815C

PRODUCT DESCRIPTION

The ET2000 Series offers an easy-to-use interface, while still allowing to-the-minute scheduling capabilities for nearly any application. This series provides 50 holiday blocks with independent scheduling to ensure the loads are always in the proper ON/OFF state. This series also includes 96 ON/OFF events for even the most demanding schedules. The scheduling capabilities, configurable outputs, and a 100-hour backup without the need of batteries, make this series ideal for nearly any application.

FEATURES

- 100-hour supercapacitor eliminates the need for batteries
- Up to 96 set points or events
- Up to 50 holiday blocks with schedule capabilities
- Automatic input voltage selection from 120 to 277 VAC, 60 Hz
- Additional mode of operation turns the ON/OFF buttons into 2-hour overrides
- Configurable outputs allow the control of various voltages and applications
- Relays incorporate zero-crossing technology to extend the life of the control
- Non-volatile EEPROM memory protects programming indefinitely
- LED compatible
- USB port makes transferring and saving of schedules easy

APPLICATIONS

- Outdoor Lighting Control
- Timing/Scheduling ON/OFF
- Machinery & Pump Controls

TECHNICAL DATA

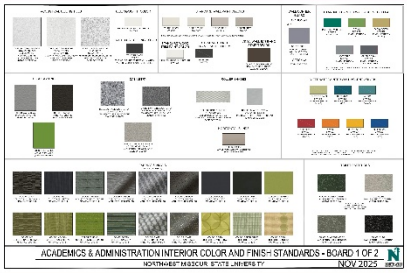
General	
Model Number	ET2815C
Description	Astronomic 7-Day/365 Day 1-Circuit Electronic Control, 120-277 VAC, SPDT, Indoor Metal Enclosure
UPC Code	078275148239
Brand	Intermatic
Country of Origin (Intermatic)	MEXICO
Warranty Period	2-Year limited

Control Specifications	
Minimum ON/OFF Times	1 min
Maximum ON/OFF Times	Indefinite
Maximum ON/OFF Operations	96
Setpoint Program Count	96
ON/OFF Operations	96
Operation Features	Astronomic; Holiday
Operation Mode	7 day
Daylight Savings Adjustment	Automatic
Backup Restoration Time	30 Minutes
Backup Type	Supercapacitor
Backup Protection Time	100 Hour
Application Compatibilities	LED

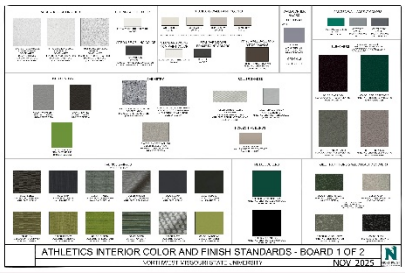
Appendix B – Interior Colors and Finishes

Click the images below to open Northwest Interior Color and Finish Standards webpage

ACADEMICS INTERIOR COLOR AND FINISH STANDARDS



ATHLETICS INTERIOR COLOR AND FINISH STANDARDS



RESIDENTIAL LIFE / AUXILIARY INTERIOR COLOR AND FINISH STANDARDS